6(3)
PERIODICAL

SPC
SOUTH PACIFIC COMMISSION

quarterly Bulletin

PUBLISHED BY THE SOUTH PACIFIC COMMISSION
NOUMEA NEW CALEDONIA

July, 1956

2/- STG.

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The South Pacific Commission

The South Pacific Commission is an advisory and consultative body set up in 1947 by the six Governments responsible for the administration of Island Territories in the South Pacific region (Australia, France, the Netherlands, New Zealand, the United Kingdom and the United States of America).

The Commission's purpose is to recommend to the member Governments means of promoting the well-being of the people of these territories. It is concerned with social, economic and health matters. Its headquarters are at Noumea, New Caledonia.

The Commission consists of twelve Commissioners, two from each Government. It normally holds one Session each year. There are two auxiliary bodies, the Research Council and the South Pacific Conference.

The Research Council assembles once a year. Members are appointed by the Commission, and are selected for their special knowledge of the questions with which the Commission is concerned, and the problems of the territories in these fields. The chief function of the Research Council is to advise the Commission what investigations are necessary. Arrangements to carry out those that are approved are the responsibility of the Secretary-General and other principal officers.

The South Pacific Conference, which meets at intervals not exceeding three years, consists of delegates from the local inhabitants of the territories, who may be accompanied by advisers. The first Conference was held in Suva in April, 1950, and was attended by delegates from fifteen territories and from the Kingdom of Tonga. The second Conference was held at Commission headquarters in April, 1953. The third Conference was held in Suva from April-May, 1956.

The Commission's staff includes six principal officers, as follows: Secretary-General, Dr. Ralph C. Bedell; Deputy Secretary-General, Mr. John Ryan; Executive Officer for Health, Dr. E. Massal; Executive Officer for Economic Development, Dr. A. H. J. Kroon; Executive Officer for Social Development, Dr. R. Seddon. The powers and functions of the Deputy Chairman, Research Council, are at present being exercised by the Secretary-General.

Further particulars of the Commission's activities may be obtained from the Secretary-General, Nouméa, New Caledonia.

NOTE: A map on which the Commission area is delineated appears on the inside back cover.

Front Cover Photograph

Delegates from New Zealand-administered territories listen attentively to a speaker at the Third South Pacific Conference, held at Suva from April 23-May 3 (story on page 6). The delegates are (left to right): The Hon. Tuatagaloa Leutele Satele Te'o (Western Samoa), Mr. Luatatasaga Kalapu (Western Samoa) and Mr. Alefaio, Faipule (Tokelau Islands).

The Hon. Leutele Te'o holds the High Chief's titles of Te'o Satele in the District of Falealili, and Leutele in the District of Falefa. In 1951 he was elected a member of the Legislative Assembly, and in 1953 became a member of the Executive Council. Leutele Te'o attended the Second South Pacific Conference as alternate delegate.

Mr. Alefaio was elected in 1954 to the office of Faipule gation from Western Samoa, was appointed Chief Translator and Interpreter in the Samoan Affairs Department in 1947. He attended the First and Second South Pacific Conferences.

Mr. Alefaio was elected in 1954 to the office of Faipule at Fakaofo.

SPC QUARTERLY BULLETIN

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THE SPC QUARTERLY BULLETIN, first published in January, 1951, features articles on selected activities in the Commission's three main fields of operation: economic development, health and social development. Articles are also contributed by specialists working in these and related fields, in the territories within the Commission area.

THE BULLETIN is given selective world distribution to people and institutions in widely differing fields sharing a common interest in the purposes and work of the Commission. It is published in two editions, English and French.

SUBSCRIPTIONS and orders for single copies should be directed to: South Pacific Commission, Box 5254, G.P.O., Sydney, Australia.

ALL OTHER ENQUIRIES relating to the SPC QUARTERLY BULLETIN should be directed to: The Editor, South Pacific Commission, Box 5254, G.P.O., Sydney, Australia.

SUBSCRIPTION RATES are as follow: One year, subscription 8/- sterling, or $1.15, by surface mail; three years, subscription 20/- sterling, or $2.80, by surface mail. Rates for postage by airmail will be supplied on application.

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THE COMMISSION does not accept responsibility for statements made in contributed articles.

Delegates and advisers attending the Third South Pacific Conference photographed with the chairman, Sir Ronald Garvey (front row, centre), and on his right, the Secretary-General of the South Pacific Commission, Dr. Ralph Clairon Bedell.

FRONT ROW (left to right): H.R.H. Prince Tupouto'a-Tungi, C.B.E., Tonga; Mr. Markus Kaisiepo, Netherlands New Guinea; Mr. William Inury, Netherlands New Guinea; Mr. Molio'o Pouli Setu, Western Samoa; Mr. Manuel A. Calvo, Guam; Dr. Ralph Clairon Bedell, Secretary-General, S.P.C.; His Excellency Sir Ronald Garvey, K.C.M.G., K.C.V.O., M.B.E., Governor of Fiji; Mataio Maka Parua Ariki, Cook Islands; Ratu K. K. T. Mara, Fiji; Hon. K. S. Reddy, Fiji; Mr. R. G. Thorby, Cook Islands; H.R.H., Prince Fatafehi Tu'ipelehake, Tonga. SECOND ROW: Dr. F. C. Kamma, Netherlands New Guinea; Mr. P. J. Merkelijn, Netherlands New Guinea; Hon. Rev. S. G. C. Cowled, O.B.E., Fiji; Josefa Rigamoto, M.M., Fiji; Mr. M. B. Orken, Papua and New Guinea; Miss E. M. Gilbert, Papua and New Guinea; Miss Hildegarde Naime, Papua; Mrs. Lila Matalau, Australian New Guinea; Hon. Mrs. Lagrimas L. G. Untalan, Guam; Mme. Hitiura Jacquemin, French Oceania. THIRD ROW: Mr. Timeaus Sambuba, Papua; Mr. Bert J. Williams, S.M.P., American Samoa; Mr. John C. Cool, American Samoa; High Chief Tuli Le'iato, American Samoa; Hon. Petero Solia, American Samoa; Mr. J. K. McCarthy, M.B.E., M.L.C., Papua and New Guinea; Mr. Molio'o Pouli Setu, Western Samoa; Mr. Manuel A. Calvo, Guam; Mr. J. M. Spivey, T.T.P.I. FOURTH ROW: Mr. Harry Tawn Nemaia, Niue; Mr. M. M. Townsend, New Hebrides; Kaobunang Iete, Gilbert Is.; Toalipi Lauti, Ellice Is.; Tebao Awerika, Gilbert Is.; Mr. Boe Kapena, Papua; Mr. G. A. Pittman, Nauru; Mahe 'Uli'uli, Tonga; Commander C. E. Miller, U.S.N.R., T.T.P.I. FIFTH ROW: Mr. Edmund Gilmar, T.T.P.I.; Mr. Togakilo, Niue; M. Georges Bule, New Hebrides; Rev. Leonard Alafurai, B.S.I.P.; Iotеba Tamuera Uriam, Gilbert & Ellice Is.; Mr. R. Turpin, Gilbert & Ellice Is.; Mr. Neli Lifuka, Ellice Islands; Mr. Kai Kai Ayoise, Papua; Mr. Peta Simogun, B.E.M., M.L.C., Australian New Guinea; Mr. Ricardo Borja, T.T.P.I. BACK ROW: Mr. Manea Tamarua, Cook Islands; Mr. Boski Tom, Australian New Guinea; Mr. Raymond Gadabu, Nauru; Mr. Apenera Pera Short, Cook Islands; Mr. Isimel Towalaka, Australian New Guinea; Mr. James Ategen Bop, Nauru.

In this article an observer records some impressions of . . . . . .

The Third South Pacific Conference

By C. E. SAYERS*

ALL who attended the Third South Pacific Conference held at Nasinu, Fiji, from April 23-May 3 last, accounted it a success, from all points of view.

The venue of the Conference was the Nasinu Teachers' Training College, five miles from Suva, where the delegates were also housed and messed, and where the administrative offices of the Conference were set up.

It was a pleasant setting of gardens and lawns, and everything possible was done for the comfort of the delegates.

Two large assembly rooms were used for the Conference meetings. In the main hall where the plenary sessions were held, special amplifying equipment carried the speeches to every corner; in addition, headphones were installed for the interpreters to translate the proceedings into French from English, or from the Pacific languages that some of the delegates used, notably pidgin, Samoan and Malay.

Sixty-six delegates, alternates and advisers attended the Conference, from seventeen South Pacific territories. In addition, the Kingdom of Tonga sent a delegation by invitation of the South Pacific Commission, of which the Conference is an auxiliary.

Observers attended the proceedings from several international, scientific, university and missionary organizations.

The members of the South Pacific Commission were also present, and before the Conference ended they met the delegations at the opening meeting of the Commission's fifteenth session.

This was the second Conference held in Fiji, the first having been held there in 1950. Again the Government of Fiji was the host. It did everything in its power to make the stay of delegates both pleasant and instructive.

Sir Ronald Garvey welcomed the delegates as Governor of Fiji, then, as Senior British Commissioner, he presided over the Conference.

* Mr. C. E. Sayers is a well-known Australian journalist who has had extensive experience in Europe and South-East Asia. During the second World War he was Director-General of the Far Eastern Bureau, British Ministry of Information. From 1947 to 1950 he was London Editor of Australian Associated Press. In this article he records his views as those of an independent journalist attending the Conference.

After welcoming visitors as Governor of Fiji, His Excellency Sir Ronald Garvey, K.C.M.G., K.C.V.O., M.B.E., presided over the Conference as its chairman.

Colourful Opening Ceremony

The official opening was a colourful ceremony, which was recorded by movie and television cameras, and broadcasting units.

Before he declared the Conference open, Sir Ronald inspected a guard of honour of Fijian troops, who were dressed in ceremonial dress of white sulu and scarlet jacket. The guard was drawn up before the flags of the six nations whose representatives form the South Pacific Commission—Australia, France, New Zealand, the Netherlands, the United Kingdom, and the United States of America.

Sir Ronald was then met officially by the Secretary-General of the Commission, Dr. Ralph Clairon Bedell, who was attending his first Conference.

Inside the Conference hall—flag bedecked, and a blaze of light from the movie and television units—the delegates sat at tables facing the Governor and the official party. Many of the delegates wore their traditional dress, but white predominated.

Among officers of the Commission who were making their last appearance at the Conference in that capacity were Dr. E. M. Ojala, former Deputy Chairman of the Research Council, and now an official of the Food and Agriculture Organization, and Mr. H. E. Maude, former Executive Officer for Social Development.

Keynote of the brief addresses at the official opening was the emphasis placed by Sir Ronald Garvey and other speakers on the value of the Conference in promoting friendship, progress and understanding among the Pacific islanders. This was demonstrated right throughout the Conference proceedings—in plenary session, in committee, in informal discussions, and in social contacts. It was demonstrated most of all in the procedure adopted for the consideration of the agenda items of the Conference.

Mme. Hitiura Jacquemin and High Chief Tuli Le'iato, delegates from French Oceania and American Samoa respectively. Mme. Jacquemin, a member of the staff of the General Information and Tourist Bureau in Papeete, Tahiti, took a prominent part in the Conference discussions, on occasion speaking on behalf of all the delegations from French Pacific territories. High Chief Le'iato, who is District Governor of the Eastern District of Tutuila, also took an active part in the Conference deliberations. He attended sessions in the ceremonial dress he is shown wearing here.

Two Standing Committees Appointed

At its first plenary session, the Conference decided to refer the discussion of those items to two standing committees. One committee dealt with economic matters, the other with social and health matters.

This decision carried out a desire expressed in the closing stages of the second Conference, which was held at Noumea in 1953, it then being considered that discussions would be more effectively conducted if the agenda subjects were considered by committees before being handled in plenary session.

When the decision was made, Sir Ronald Garvey, speaking as chairman of the Conference, said the committee system was breaking new ground in such a Conference. It was experimental, but he felt that it could succeed.

The general sense of the brief discussion which was held on the recommendation, which came from the general committee, was that discussions could be followed much more easily in smaller committees than in a large assembly.

A Successful Experiment

There is no doubt that the experiment succeeded. It was a major advance in the procedures of the South Pacific Conference, and every delegate must have profited from it.

It should go without saying that at

Delegates Formed General Committee of Conference

The following delegates formed the general committee of the Third South Pacific Conference which was responsible for the order and general conduct of business:

Mr. Raymond Gadabu, delegation from Nauru, representing the Australian territories.

M. Jacques Drollet, delegation from French Oceania, representing the French territories.

Mr. Markus Kaisiepo, delegation from Netherlands New Guinea, representing Netherlands territories.

Mataio Maka Parua Ariki, delegation from the Cook Islands, representing New Zealand territories.

Ratu Kamisese Kapaiwai Tuimacolai Mara, delegation from Fiji, representing United Kingdom territories.

Mr. Manuel A. Calvo, delegation from Guam, representing United States territories.

CONFERENCE ATTENDANCES

Representatives from the South Pacific Territories

AMERICAN SAMOA

Delegates
HIGH CHIEF TULI LE'IATO, District Governor, Eastern District of Tutuila.
CHIEF PETERO SOLIA, Speaker of the Legislature.
Alternate Delegate
BERT J. WILLIAMS, Samoan Medical Practitioner.
Adviser
JOHN COLE COOL, Samoan Affairs Officer.

BRITISH SOLOMON ISLANDS PROTECTORATE

Delegates
SILAS SITAI, B.E.M., Administrative Assistant, Eastern Solomons District.
Rev. LEONARD ALAFURAI, Member of Malaita Council.

COOK ISLANDS

Delegates
MATAIO MAKA PARUA ARIKI, Chief of Atiu Island.
MANEA TAMARUA, Cook Islands Medical Practitioner.
Advisers
APENERA PERA SHORT, Co-operatives Officer.
RONALD GALPIN THORBY, Resident Agent, Atiu.

FIJI

Delegates
Hon. RATU KAMISESE KAPAIWAI TUIMACILAI MARA, Member of Legislative Council.
Hon. K. S. REDDY, Member of Legislative Council.
Alternates
Hon. Rev. S. G. C. COWLED, O.B.E., Member of Legislative Council.
JOSEFA RIGAMOTO, M.M., Assistant Lands Commissioner.

FRENCH OCEANIA

Delegates
JACQUES DENIS URATUA DROLLET, Headmaster, Papeari School.
Mme. HITIURA JACQUEMIN, Member of General Information and Tourist Bureau, Tahiti.

GILBERT AND ELLICE ISLANDS

Delegates (Gilbert Islands)
KAOBUNANG IETE, Manager, Tangitang Tarawa Co-operative Society Ltd.
TEBAO AWERIKA, Magistrate, Arorae Island.
Delegates (Ellice Islands)
TOALIPI LAUTI, Teacher.
NELI LIFUKA, Member, Ellice Islands Wholesale Society.
Advisers
IOTEBA TAMUERA URIAM, Assistant Co-operative Societies Officer.
RICHARD TURPIN, Lands Commissioner, G.E.I.C.

GUAM

Delegates
MANUEL A. CALVO, Director of Agriculture.
Hon. Mrs. LAGRIMAS L. G. UNTALAN, Member of Third Guam Legislature; Member of Committee on Education and Labour.

NAURU

Delegate
JAMES ATEGEN BOP, Councillor, Nauru Local Government Council.
Alternate
RAYMOND GADABU, Nauruan Affairs Officer and Magistrate of Nauru District Court.
Adviser
GEORGE A. PITTMAN, Director of Education, Nauru.

NETHERLANDS NEW GUINEA

Delegates
MARKUS KAISIEPO, Editor of "Pengantara", and Member of the Advisory Council for Municipality of Hollandia.
WILLEM INURY, Member, Advisory Council, Hollandia.
Alternate
RADJI IBRAHIM BAUW, Radja of Roembati, Co-operatives leader.
Advisers
Dr. FREERK CHRISTIAANSZ KAMMA, Field Director, Protestant Mission, Netherlands Reformed Church.
PIETER JOHANNES MERKELIJN, Head of Public Education Division, Department of Cultural Affairs, Hollandia.

NEW CALEDONIA

Delegates
Mme. JEAN GUIART, member of the Wahnyamala family of Kedheny, a junior branch of the line of High Chiefs of the Loessi District of Lifou, Loyalty Islands.
VICTOR RIBAUD, Vice-Principal, Teachers' Training School, Nouville; Member of Advisory Council on Education.
Advisers
ROGER JEAN-MARIE MAYLIE, Head of the General Administration Office and Native Affairs (Cabinet of the Governor).
ANDRE BARRES, Inspector of Primary Schools.

PAPUA AND NEW GUINEA

PAPUA

Delegates
Miss HILDEGARDE NAIME, Lecturer on Child Care at Training Hospital and Hanuabada Schools.
BOE KAPENA, Senior Co-operatives Inspector.
Alternates
KAI KAI IVAISE, Agricultural Extension Assistant, Department of Agriculture, Stock and Fisheries.
TIMEAUS SAMBUBA, Chief Instructor, Native Medical Orderly School, Saiho.

NEW GUINEA

Delegates
PETA SIMOGUN, B.E.M., Member of the Legislative Council.
ISIMEL TOWALAKA, Local Government Assistant and Plantation Owner.
Alternates
BOSKI TOM, Senior teacher, Department of Education.
Mrs. LILA MATALAU, School teacher.
Advisers—Papua and New Guinea
JOHN KEITH McCARTHY, M.B.E., Member of Legislative Council and Acting Director, Department of Native Affairs.
MARCUS BENJAMIN ORKEN, Assistant District Officer.
Miss EDNA MAY GILBERT, Responsible for Infant and Maternal Welfare Services in the Northern District.

NEW HEBRIDES

Delegates
KALSAUTU, Chief of the Tribe of Mele, Efate Island.
GEORGES BULE, Clerk at the British Residency, Vila.
Advisers
J. GUIART, Social Anthropologist at the French Institute of Oceania.
MICHAEL MILNES TOWNSEND, British District Agent, Central District No. 1.

NIUE

Delegate
TOGAKILO, Assistant Supervisor, Department of Education.
Adviser
HARRY TAWN NEMAIA, Dentist and Medical School trainee.

TOKELAU ISLANDS

Delegate
ALEFAIO FAIPULE.

KINGDOM OF TONGA

Delegates
H.R.H. PRINCE TUPOUTO'ATUNGI, C.B.E., Premier of Tonga.
H.R.H. PRINCE FATAFEHI TU'IPELEHAKE, Minister of Lands and Health.
Adviser
MAHE 'ULI'ULI, Accountant.

TRUST TERRITORY OF THE PACIFIC ISLANDS

Delegates
EDMUND GILMAR, Interpreter-translator, Office of District Administrator, Yap.
RICARDO TUDELA BORJA, Member of Congress of Saipan.
Advisers
JOHN MARION SPIVEY, Contracts and Programs Officer, Trust Territory Government.
Commander CHARLES ELLIS MILLER, U.S.N.R., Naval Administrator, Saipan District, and Commanding Officer, Naval Personnel.

WESTERN SAMOA

Delegates
Hon. TUATAGALOA LEUTELE SATELE TE'O, Member of Executive Council.
FA'ALAVA'AU GALU, Chairman, Fono of Faipule.
Alternates
Hon. TO'OMATA LILOMAIAVA, Member of the Legislative Assembly.
MOLIO'O POULI SETU, Member, Fono of Faipule.
Secretary-Interpreter
LUAFATASAGA KALAPU, Chief Translator and Interpreter, Samoan Affairs Department.

Representatives from Official and Non Official Institutions

Roman Catholic Missions and Organizations in the South Pacific: The Most Rev. VICTOR FOLEY, S.M., Vicar Apostolic of Fiji.
National Missionary Council of Australia: Rev. C. F. GRIBBLE, General Secretary Department of Overseas Missions, Methodist Church of Australia.
The National Missionary Council of New Zealand: The Rt. Rev. L. S. KEMPTHORNE, C.B.E., Bishop in Polynesia.
The Missionary Board of the Netherlands Reformed Church: Dr. F. C. KAMMA (also member of Netherlands New Guinea Delegation).
The French Institute of Oceania: J. GUIART (also member of New Hebrides Delegation).
Pacific Science Board of the United States National Research Council: Dr. GEORGE P. MURDOCK.
United Nations Educational, Scientific and Cultural Organization, Paris: Mr. COLIN D. EWERS.
Food and Agriculture Organization, Rome: Dr. E. M. OJALA.
World Health Organization, Geneva: Dr. JOHN STRAHAN.
Tri-Institutional Pacific Program: Mr. HAROLD J. COOLIDGE.
Pacific Science Association: Dean KNOWLES A. RYERSON.
University of New Zealand: Professor K. B. CUMBERLAND.

Other Attendances

Commissioners of the South Pacific Commission, alternates and advisers nominated by member Governments were present as observers. The Secretary-General and other principal officers of the South Pacific Commission also attended.

At a tea-party at Government House, Suva, during the Conference. Left: Her Excellency Lady Garvey greets H.R.H. Prince Tu'ipelehake of Tonga. Right: The Secretary-General of the South Pacific Commission, Dr. Ralph Clairon Bedell, chats with other guests. Left to right: Dr. Bedell, M. Guiart, M. Roger Maylie, Mme. Barrau, Mme. Guiart.

future Conferences the procedure will become standard, and most observers were in agreement with the view that from now on an even more direct and positive part in the conduct of the Conference would be played by the delegates themselves.

Ratu Mara, leader of the Fiji delegation, was elected chairman of the economics standing committee, and Prince Tungi, leader of the Tonga delegation, was elected chairman of the social and health committee. Mrs. Lagrimas Untalan, of the Guam delegation, was elected deputy chairman of the social and health committee. In the latter stages of the Conference, when Prince Tungi had to leave Fiji, Mrs. Untalan presided over that committee with credit.

In the handling of committee business the young Fijian administrator, Ratu Mara, was outstanding; indeed, he was easily the outstanding figure at the Conference. Intelligent, patient, alert, he held the chair of the economic standing committee with easy confidence and charm. This, probably, was the chief reason for the economic committee's yielding the most positive results from the agenda subjects discussed.

Wide Variety Of Agenda Items

The agenda covered a wide field of subjects and interest. Among the set subjects on which introductory papers had been prepared were the following:

ECONOMIC EDUCATION and the importance of sound economic development to the welfare and progress of the people (introduced by the Netherlands New Guinea delegation)

INDUSTRIAL AND COMMERCIAL PROGRESS and development:

(a) indigenous industries; progress of and new industries established;

(b) problems of modernizing and mechanizing industrial and commercial enterprises;

(c) processing of agricultural and mineral products

(introduced by the New Caledonia delegation)

FARMING SYSTEMS, including the place of livestock in the South Pacific (introduced by the Papua and New Guinea delegation)

CO-OPERATIVE SOCIETIES AND CREDIT UNIONS as a means of promoting the welfare of the South Pacific people (introduced by the Fiji delegation)

The Conference in plenary session in the main hall at Nasinu Teachers' Training College. Interpreters translated the proceedings through headphones to delegates from French-speaking territories.

The Hon. Mrs. Lagrimas Untalan of the Guam delegation, who was elected deputy-chairman of the social and health committee.

Traditional Archway At Entrance

Entry to the site of the Third South Pacific Conference — the Teachers' Training College at Nasinu, Fiji—was gained through an archway consisting of four bamboo columns, the bases of which were bound with twine made from the coconut fibre, locally known as Magi Magi.

The columns supported replicas of ancient Fijian war clubs, each fourteen feet in length.

At the top of the arch was a Fijian fan bearing the inscription, "Fiji 1956". Its inclusion in the general design was in allusion to the important part played by the fan in ancient Fijian warfare and dancing.

Suspended from the clubs was a symbolic whale's tooth, or Tabua, probably twenty times the size of a normal specimen. The Tabua has been the symbol of welcome from the days of earliest Fijian history. Its display on this occasion was a fitting welcome to the Conference delegates.

The archway was designed by Mr. Hans Furrer, of the architect's branch of the Public Works Department, Government of Fiji.

THE ROLE OF CUSTOM in the social development or social retardment of the populations of the South Pacific; means for adapting custom to modern living conditions: improvement of social conditions of the people by modifying custom (introduced by the Western Samoa delegation)

INDIGENOUS ARTS, CUSTOMS AND CULTURES: encouragement and retention where useful (introduced by the Fiji delegation)

INFANT AND MATERNAL WELFARE, having regard to social services, community organizations and the improving living conditions (introduced by the American Samoa delegation).

In addition, the Conference had before it for discussion a report by the Secretary-General on the work of the South Pacific Commission, and a review of the action taken on resolutions of the previous Conference

All those matters were considered, after discussion in one or other of the standing committees, at eight plenary sessions of the full Conference.

Meeting Between Conference And Commission

There was also a joint meeting between the Conference and the Commission, at which the chairman of the fifteenth session of the Commission, Dr. H. J. Levelt, Senior Commissioner for the Netherlands, presided.

This joint meeting, which was one of the items listed on the Conference agenda, lasted more than an hour.

The discussion touched on such subjects as the investigation of the drying and storing of breadfruit, and the development of new strains of all-the-year breadfruit; search for a substitute for milk, important to Papua and New Guinea; preference of employment by the Commission to people of the South Pacific region.

In answer to the question: What were three successes of the Commission, the Secretary-General named fisheries development, nutrition and co-operatives.

As to failures, the Chairman suggested, amidst laughter, that an outsider could see them (as well as successes) better than a member of the Commission.

Main Conference Recommendations

Thirty-three resolutions came from the deliberations of the Conference. Possibly the most interesting related to a significant feature of the Conference discussions; the greater use of the languages of the South Pacific.

A resolution of the social and health committee recommended that a school reader for children of from 12 to 15 years should be published in the major languages of the South Pacific, as well as in English and French, which are the official languages of the Conference.

The suggestion came from the New Caledonia delegation. It envisages a publication to include simple extracts

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CONFERENCE RESOLUTIONS

Thirty-three resolutions were passed by the Third South Pacific Conference. These were considered at a special session of the South Pacific Commission, held for the purpose immediately following the Conference. The full texts of both Conference resolutions and Commission recommendations regarding them appear in the PROCEEDINGS OF THE FIFTEENTH SESSION, *which may be obtained from the South Pacific Commission, Box 5254, G.P.O., Sydney, price 2/- stg., or 30 cents U.S. per copy post free by surface mail.*

Nursing Aids For Merauke Villages

In the south-east corner of Netherlands New Guinea live some seventeen thousand Papuans in one hundred and fifteen villages. To lower the high infant mortality rate in the area, and to promote better health generally, the Administration is training selected village girls as Mother-Child-Health (M.C.H.) aids. How this project is being carried out is described below . . .

By LOUIS M. VEEGER
Chief Medical Officer
Merauke, Netherlands New Guinea

A M.C.H. nurse and group of M.C.H. aids.

THE south-east corner of Netherlands New Guinea comprises an extensive plain south of the River Digoel on the mainland, together with a vast island, with muddy soil. Total area is 29,300 square miles. Several rivers cutting through the plain make it swampy for the greater part of the year.

The total number of Papuan inhabitants is 17,600, living in some 115 villages along the coast and rivers. They belong to many different tribes; of these, the Marind-anim are well known. The capital of this area is Merauke, with 2,350 inhabitants. The climate is tropical, and there is a really dry season from about June to December.

General Health Conditions

The cultural environment of the people is archaic. Living conditions are unhygienic. Housing, cleanliness, water supply, waste disposal and so on are very primitive.

The pattern of diseases in the area is known. Malaria, pneumonia, influenza, tuberculosis and malnutrition are the main causes of mortality. Typhoid fever, cholera, smallpox and plague do not occur. There is a very high death rate among children below the age of one year, caused by premature birth, malaria and inadequate nutrition.

All tribes in the area have different nutrition habits. Either sago or tuberous plants form the staple food, depending on customs and local availability. Nearly everywhere people are accustomed to eating coconut meat. Fish and meat supplies are very irregular, and are dependent on the season (dry or wet). The Marind-anim people are not used to eating green vegetables; other groups eat them rarely.

In all the areas examined by the Dutch nutrition specialist, Dr. R. Luyken, a protein shortage was found to exist in the diet of the Papuans. This deficiency was least pronounced among the Marinds. Slight deficiencies in vitamins B, A, B_1 and C were also found in the diet. The feeding of babies is particularly unsatisfactory; additional food is given late, and when it *is* given it appears to contain insufficient protein and vitamins.

The Agricultural Information Service of the Government endeavours to improve the diet by introducing more efficient methods of agriculture. Local development plans have been successful.

The main problems encountered by those whose task it is to promote better health are the scarcity of population and the extreme difficulties of transportation in this vast, empty and swampy region, over which the people are scattered in a great number of small communities.

The distance between one village and the next is always great. Except in the coastal area communication is possible only by boat, small vessels or, in the dry season, by hiking on foot along jungle tracks. No roads for cars or jeeps are available, except in the vicinity of Merauke. The beach is dissected by many rivers, large and small. In the rainy season big swamps form which impede rapid communication.

Public Health Organization

The Public Health Service maintains in Merauke an efficient 120-bed hospital staffed by Dutch physicians and nurses. In the hinterland there are three auxiliary hospitals each with accommodation for twenty patients, plus an out-patient de-

Left: Before the M.C.H. clinics were introduced, mothers often had to walk for days carrying baby, bedding and food, to reach medical help. Right: Where help is far away this may result. This baby will now receive M.C.H. aid.

Travel from village to village is not always easy. The M.C.H. nurse and aids have been taken to shore in this canoe from the Government launch in the background.

partment. A mantri (native medical assistant) who has received four years' training is in charge of each of these poly-clinics. All the villages are visited regularly by physicians and mantris.

Since we became aware of the urgent need to conquer the high mortality among babies, and to promote the health and nutrition education of the people, our work has had to be intensified. However, conditions being as they are, medical care by travelling physicians or assistants could only be irregular, while medical aid could seldom be obtained immediately when needed, because of the severe transportation problems.

It was found that the only solution was to furnish permanent medical care in the villages, and a selected group of girls was chosen to be trained as Mother-Child-Health (M.C.H.) aids.

Thus was launched a project to supply every village with medical help. It needs no further comment that we chose girls for this work, who would concentrate on infant welfare and maternity nursing and who could, furthermore, provide the most essential medical assistance.

The Training Programme

The girls had a basic knowledge of the three R's, acquired at their village schools or at the boarding school at Merauke. The training, carried out in the main hospital, was divided into three stages:

First Stage: Practical household management and home economics.

Second Stage: Practical nursing in hospital wards, and a curriculum consisting of lessons in diagnosis and treatment of the most common diseases, nutrition, maternity nursing and assistance at confinement, infant welfare work, including the preparation of baby feeding, and general hygiene especially adapted to village conditions. Lessons in morality, politeness, day nursing and playing with children are also given at this stage.

Third Stage: Continuation and repetition of the curriculum; practice in the out-patients' department; infant maternity welfare clinics in the neighbouring villages, and in the maternity ward and delivery room in the hospital.

For every stage a period of six months has been fixed; there are trainees, however, who can skip the first stage while others have to double the second or third.

Village Tasks Of M.C.H. Aids

Every day an M.C.H. aid keeps her consulting hour and goes into the village to look after the babies, to check whether there is any infant illness, and to nurse sick people at home. After that she prepares baby food, helps mothers to prepare baby's bottle adequately according to its age, etc., watches over the children left in the day nursery by mothers who have to go out for food gathering, and so on.

Every Saturday morning the babies are weighed and the mothers advised in matters of nutrition and care. Pregnant women are examined and are given their malaria prophylaxis.

Every fortnight families with children, and their households, are examined. The aid makes an inspection of the village once a month, accompanied by the chief.

In future, M.C.H. aids will also read to the population lessons prepared by the physician. They will also provide health and nutrition education as a daily routine when giving advice and stimulating the interest of mothers and children in improving hygiene.

Because the M.C.H. aid is more educated and advanced than the people in her care, the simple fact of her presence is already tending to stimulate improvement by the example set by her way of living.

Inspection By M.C.H. Nurse

All sections of the work of M.C.H. aids are inspected by an M.C.H. nurse who visits every village four times a year. An administrative system simplifies the inspection.

The M.C.H. nurse has a specialized task. In the area she gives guidance to the M.C.H. aids; otherwise they would have too strenuous a task to maintain work to the required standard. The nurse's task of maintaining the cultural and moral status of the aids has proved as necessary as it is difficult.

In her district she is also occupied with

Some of the M.C.H. nurses belong to religious orders. Here, one gives a talk on child care to a group of Papuan mothers, while M.C.H. aids listen in the background.

health education. She gives lessons and demonstrations to the village people. In the main village of her area she devotes much time to youth education by organizing sing-songs, play-acting and sports. At yearly meetings of the whole population of the district friendly rivalry is developed by arranging competitions relating to health work.

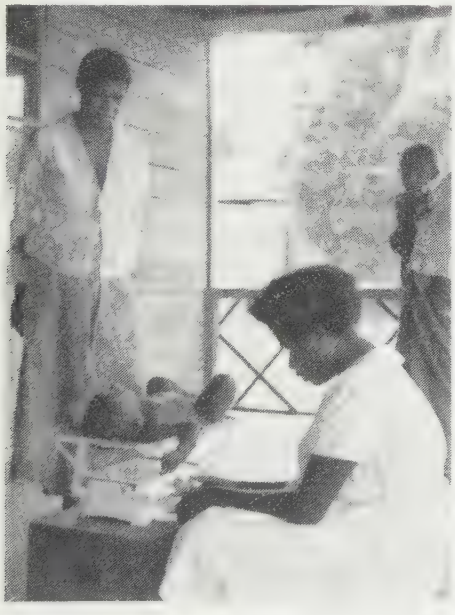
In other smaller, more remote villages which the M.C.H. nurse visits for shorter periods, she can only begin this work, leaving its further development to the M.C.H. aid, whom of course she will continue to supervise during her regular visits.

Apart from these activities, the M.C.H. nurse has certain curative duties, including treatment and nursing of the patients assembled at her auxiliary hospital.

Financial Aspects

Total expenses needed for training one M.C.H. aid in the hospital at Merauke, including housing, food, clothing, teacher's salary and trainee's pocket money, amount to 700 guilders (£70) per year. Duration of the training is eighteen months.

The cost of installing an M.C.H. aid in



An M.C.H. aid has set up her clinic on this verandah; her equipment box makes a good table.

a village, including cost of domestic and nursing outfit and instruments, amounts to 500 guilders (£50).

Total expense of one M.C.H. aid working in a village of under 200 inhabitants, including salary, feeding, service dress, drugs, and extra feeding for babies suffering from insufficient nutrition, amounts to 1,000 guilders (£100) per annum.

The recent economic development in the area is not sufficient to enable the people to provide the finance needed to support M.C.H. aids in their villages, and the Government therefore bears the cost, so helping until the people themselves can provide what is needed for their own social care.

It is not to be expected that the M.C.H. aids system ensures adequate health care and prevention of disease. It does, however, constitute an attempt to fight the heavy infant mortality and to provide, at this stage of development, the most necessary medical assistance. It is evident that social and economic development must progress together. The public health programme can never attain sufficient success if there is no progress in economic and agricultural development, and elevation of cultural life at the same time. To obtain this improvement it may be worth while to try out a similar system of village-located aids in other fields of welfare.

This is a system employing people of the district working in their own villages after having attended a short, cheap, vocational training course, with a simple curriculum reduced to essentials and directed at a special task. For instance, girls trained in domestic science and young men trained in horticulture could immediately provide improvement of domestic economics and hygiene, purchasing and preparing of foodstuffs and cultivation of necessary crops.

In this way, central groups could be formed in the village consisting of the better-educated and informed people, each able to guide the population in his own field.

Even in the open air help may be given on the spot—for grown-ups as well as for babies.

These groups, too, can develop their activities completely only if an economic development project can be organized and put into operation, to provide a regular income enabling the people to pay for their own social care. Only then can the M.C.H. aids system, which now works in advance of this general development, have its full impact.

The Grasses of Fiji

THE GRASSES OF FIJI. J. W. Parham, Suva: Government Press; 5s. 1956. pp. x-166. Illust. (Bulletin No. 30, Department of Agriculture, Fiji.)

THE grasses are probably of greater economic importance than any other plant family. They include such major food crops as rice, wheat, maize, barley, oats and sugar cane, and are the main constituents of most of the world's pastures. Bamboos (which are large woody grasses) are in the warmer parts of Asia very widely used as light structural material, an example which might with advantage be followed in the Pacific islands to a greater extent than it is today. Besides the useful grasses, the family contains some troublesome weeds.

The original native flora of the Pacific islands was poor in grasses compared with many other parts of the world. In settled areas, introduced grasses have now, however, become a very prominent feature of the vegetation. Most of these introduced species, coming from Asia, Africa and America, are now widespread through the Islands, so that a list of the grasses of Fiji includes many which occur also in other parts of the Pacific. This makes the book under review valuable far beyond Fiji, although written in the first place for that group of islands. A few of the species mentioned may be confined to Fiji, but anyone in the Islands who wishes to identify a common grass has a good chance of finding it in this book.

The grasses are botanically a difficult family, with a great number of species separated by characters which are not always easy to follow. The author has dealt with these difficulties by giving a description of each species; the language used is unavoidably technical, but an adequate glossary of technical terms is provided. The more important species are illustrated by very clear line drawings, which for many people will be easier to use than the descriptions. The economic aspects of each species, whether as food for man or beast, or as a weed, are briefly indicated, together with information on its distribution within and beyond Fiji.

The book is well produced. Few misprints were noted, and none of importance. The line drawings, which many readers will use in preference to the descriptions when identifying grasses, are well reproduced. The photographic illustrations are less successful, but they are a less essential feature of the book.

Altogether this Bulletin can be recom-

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Rammed Earth Construction For Self-Help Building

According to the author, buildings of rammed earth are permanent, offer excellent insulation against heat and cold, and are proof against termites, borers, rot and fire. Only simple, low-cost equipment is needed for their construction, while building methods are straightforward.

By G. F. MIDDLETON*

This five-roomed house, built in Ceylon with rammed earth, provides accommodation for a superintendent on a coconut plantation.

IT is the author's opinion, born of experience, that the house is of first importance to the community because it is there that family life is developed, and with it a sense of ownership, responsibility and an instinctive feeling of good social standing, which reflects itself in productive effort, and in turn results in the provision of sufficient food.

And so, with good health attendant upon a knowledge of hygiene and the exercise of proper sanitary habits, which are possible only if the right kind of dwelling is provided, the circle is completed to establish a healthy, happy community.

Setting these words on paper and stating what is needed is a simple matter, but carrying the decisions into effect is rather more complicated. This becomes clear when it is realized that there are so many factors to create difficulties and problems in the wide divergencies between situations, available materials, habits and customs of different peoples and even the bearing which many religions have upon the home life. In some countries caste distinctions also create problems in regard to the houses and the work of constructing them. Climate, of course, is all-important: designs for arid regions will not suit the humid tropics.

Hence the first necessity is to study at first-hand all of those factors before deciding on the best means to employ for the materials, workmanship and design. Within the South Pacific region there are many differences—of people and of available materials—but it is believed that one factor remains the same everywhere, and that is the necessity to use only indigenous materials for the construction of houses and ancillary buildings.

Preliminary Survey Of Materials Essential

First, a survey must be made of all indigenous materials available in the district where building is planned. Secondly, the methods of adapting the chosen materials must be determined and designs produced. Then the skills of the local craftsmen have to be employed in shaping and fitting together the components. Usually there is a great deal to be learned from the local experts which can be applied in the development of the house type. Experience in a number of under-developed countries has shown that the craftsmen in each have acquired knacks in the use of certain local materials or have used their ingenuity to produce some item in the building where, as usual, necessity has been the mother of invention.

Thus, by studying all the factors mentioned, applying the sciences evolved in research establishments and their laboratories, and sometimes adding to the skills and arts of local craftsmen those of craftsmen of other countries, constructional methods and combinations of materials are likely to be developed which are suitable to a particular region.

In the same way, climatic and sociological studies applied to the design and location of buildings constructed with indigenous materials will give them enhanced comfort and greater health benefits. The result should be houses which seem to belong to their surroundings, to grow out of their background with the naturalness which is so often seen as the result of local crafts.

Houses Of Rammed Earth

Now let us briefly consider the essential parts of the houses and, for that matter, of the other buildings needed in a community such as schools, hospital clinics, stores and animal sheds, meeting places, and so on.

The bulk of the building consists of walls and floors, and usually about one-third of roof; so first we will discuss walls. There may be parts where field stones, or spalls, may be available in sufficient quantities to build rubble walls, or rock which can be cut to shape for masonry. Another alternative sometimes found is a close-textured coral, which can be cut to suitable building-block size. Limestone, gypsum and such-like deposits can be looked for. It

* Mr. Middleton has had considerable experience as a building research officer for the Australian Commonwealth Government and as an expert on low-cost housing for the United Nations, acting in that capacity in Middle and Far Eastern countries.

Setting the straight mould in position.

will be found, however, that in the majority of places there will be none of these. There will be, nevertheless, every reasonable certainty of plenty of earth; natural earth containing clay, silt, sand, gravel, stones and granular mineral, endlessly varying proportions of some or all constituents.

In some places, also, there may be ample available timber suitable for building. Timber is, however, an unsatisfactory material for building walls and floors in tropical and sub-tropical regions because of the ravages of termites (white ants), borers, wood-rot, fungus, insect pests generally. There is also always the fire risk.

On the other hand, earth wall construction, if properly carried out, gives us the multiple benefits of excellent insulation against heat and cold, proof against termites, borers, rot and fire. The supply of material is generally inexhaustible, while the structures are permanent, solid, healthy and safe. Only simple, inexpensive equipment is needed for construction of this type of building, while methods are easily understood.

Floors of rammed earth can be surfaced with a number of different materials to make them washable and resistant to normal abrasion.

Earth Used Before Bricks

Ordinary earth is one of the oldest of building materials: it was used to make walls ages before men learned to bake clay earth to make bricks. Almost every country in the world has its quota of houses and other buildings made with walls of earth, some by one method, some by another.

Ramming the earth *in situ* (using large, progressively-moved moulds) to make it hard and dense, while at the same time avoiding multiple handling of the material, is a more recent method which seems to be not more than about two hundred years old.

The supposition is that in many, or perhaps most, of the islands of the region, construction of the walls and floors with rammed earth could be the answer to a pressing need because of the many advantages, not the least of which is cost.

The next single problem then becomes the roof, and even this can be built of earth if timber is unavailable. Some recent work carried out in India by Dr. S. Mehra, of the Karnal Building Research Laboratory, showed how a house designed on the principle of a parabolic arch to contain both walls and roof could be built entirely of rammed earth.

The timber and earth hacienda roof of South America, or frameless arched roofs employing various different materials, are other examples of what can be done to complete the desired shelter in different situations.

Again it can be said that a study of the different localities could produce a suitable type or types.

From the foregoing brief details it will be clear that rammed earth construction methods would be entirely suitable for self-help building because there is nothing complicated or difficult to be learned. Some experience is necessary to acquire the knacks and put the methods into good practice. On contract work only unskilled labour is required, but the overseer must have a certain amount of training, and the same applies to self-help home-builders.

Materials And Methods Of Construction

Modern methods of constructing buildings with rammed earth walls might be applied in the South Pacific region with

Left: Ramming a corner section of wall, using a steel-headed rammer. Right: This photograph shows the construction of rammed-earth workers' dwellings in Ceylon—ramming of the fourth and fifth courses.

Left: Officers of the Native Affairs Branch observing the construction of a two-roomed rammed-earth house at Darwin, Northern Territory, Australia. The whole of the work was done by aborigine labour. 1952. Right: Laying the roof timbers of bush poles.

very great benefit to the people. These methods have been proved suitable for tropical conditions by work done in the Northern Territory of Australia, in India and in Ceylon. In all of these places the shortage of normal building materials and scarcity of skilled men to handle them, has created a demand for structures which require a minimum of both.

A wide range of soils can be used to build rammed earth walls, and usually it is unnecessary to go far from the building site to obtain the soil that is needed. A good soil for ramming should contain not less than 50% and not more than 80% of sand, gravel, and small stones; the remainder should be clay of a good binding quality. It is easier than may be thought to find earth answering this description.

Occasionally, when the right type cannot be found, it may be necessary to adjust a soil by adding river-bed sand, or clay, to it, or to mix two or more soil types together to produce material approximating to the ideal.

Simple tests can be made to determine the suitability of a soil. For instance, the initial selection can be made by judging the colour and feel of the earth. Black or very dark soils are usually unsuitable; red, yellow, light brown and white soils are usually good. The texture can be felt by rubbing a small sample between thumb and fingers. Grittiness denotes the sand, whereas the clay will feel silky smooth and will adhere to the skin. Final judgment is made by a simple analysis which requires no special equipment.

There are several methods of constructing earth walls; the rammed *in situ* (monolithic) method; the rammed earth block (masonry) method; and the adobe (sun-dried clay block) method. Moreover, sometimes these different methods can be combined with advantage. However, with few exceptions the rammed earth method of *in situ* construction is preferred, owing to the elimination of multiple handling of materials in its single-operation simplicity.

First the building is set out on the ground, and the trenches for the foundations dug. For most single-storeyed buildings on good soil the foundation may consist of a 6"-9" layer of hard core the full width of the trench and about 12" below ground level. Good rubble, well rammed or truly laid in mud mortar will serve, but the top should be levelled off to provide a uniform and level base for operating the mould.

The wall from the foundation up to damp-proof course level is built of rammed earth, preferably using earth stabilized with some kind of waterproofing material. The author generally uses Portland cement when this is available.

After the damp-proof course has been laid, the walls of the superstructure are continued either with plain earth or with earth containing a lesser proportion of stabilizer than that in the base wall. The processes for building the walls are as follow:

The angles of the walls should be constructed first. Specially-designed angle "moulds" are used. One such is placed in position for the first corner of the building, its bottom edge resting on the foundation course in the trench. The mould is chocked in the trench to prevent its lateral movement. The prepared soil is then tipped into the mould until a layer of 4" in depth is spread at the bottom. This layer is rammed down with a metal-headed rammer weighing approximately 14 to 18 pounds, the square-faced head of the rammer searching the sides and corners of the mould to ensure even compaction of the earth layer.

This process is continued layer after layer until the entire mould is filled with rammed earth. No time lag is required for setting, so that immediately on completion the mould is removed, leaving behind the compacted angle section of wall. Next, the straight-sided mould is placed in position with one end lapped about 6" over the just-completed wall section. The mould is then plumbed and levelled and made firm.

The operations previously explained are then repeated until the mould is full, when it is loosened and pushed along to ram the next section.

In this way, by ramming the corner sections ahead and then the straight sections successively until they meet up with the corners, a full course 2' high is completed. Immediately the first course is finished, the moulds are placed in position above the completed course with 6" of the bottom edges of the shutters lapped over it. During the ramming of these subsequent courses, stop-shutters are inserted at the required positions to allow for door and window openings. In this way the walls are completed, course by course, until the roof level is reached.

Attaching The Frames

There are several different ways of attaching the frames to the walls. The most popular method is to set wooden blocks in the reveals of the openings at the time of ramming those parts. The frames are subsequently screwed or nailed to these plugs. In the same way plugs are inserted in the walls for other fixtures and fittings as required.

Floors of rammed earth can be surfaced in many different ways. It is

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Some Lesser-Known Pacific Food Plants

Hibiscus Manihot

Some lesser-known food plants of the South Pacific islands are discussed in this concluding article of a series on subsistence food plants of the region.

By EMILE MASSAL and JACQUES BARRAU

Executive Officer for Health, South Pacific Commission — Subsistence Agriculture Officer

THE articles published to date in this series have dealt chiefly with the staple food plants of the South Pacific islanders. This concluding instalment draws attention to some vegetable food resources of the region that are generally not well known.*

Green Leaves And Shoots

The utilization of taro and sweet potato leaves as vegetables has been mentioned in earlier articles. Besides these, the leaves or shoots of three plants are frequently consumed in Melanesia.

The first is found in most Melanesian territories from New Guinea to Fiji, although not in New Caledonia. This is a tree, *Gnetum gnemon*, L. It belongs to a curious botanical family, the *Gnetaceae*, related to the Gymnosperma, although it has some of the characteristics of dicotyledons.

The distribution area of this family extends from Eastern Malaysia to Fiji. The Melanesians gather its leaves and fruit for food. It is in New Guinea, however, that this plant is most highly appreciated. We have observed the leaves of this plant being used in the islanders' diet in the New Hebrides, where it had not previously been recorded.

Gnetum leaves, which have a pleasant taste, are eaten cooked. Their chemical composition indicates that they constitute an appreciable supplement, especially for diets deficient in vitamin A. A fibre of good quality is processed from the bark of the plant and is used by islanders, especially in New Guinea, for making net bags.

In New Guinea, *Gnetum gnemon* is known under the pidgin name of "tulip" as well as under a number of vernacular appelations such as "sulun", "puam", "gayasu", etc. It is called "dai", "su'a", "poke", "weive", "onlowa", "boke", "leke", "leko" in the Solomon Islands, "wasu" on Pentecost Island in the New Hebrides, and "sikau" (or "sakau") in Fiji.

In New Guinea the shoots of a grass are often used as a vegetable. This is *Setaria palmifolia* (Koen.) Stapf., which is also used for food in Malaysia and Indonesia. It is worth mentioning that the seeds of this plant provide a substitute for cereals in some parts of the Philippines. It is known as "kru bilong grass" in New Guinea pidgin. Two short-stemmed varieties with thick shoots are generally grown in the gardens; one

* These articles, revised and expanded, will shortly be published in the Commission's Technical Paper series, with the title **Food Plants of the South Sea Islands.**

Left: The leaves and fruit of Gnetum gnemon form a popular food among Melanesians, particularly in New Guinea. Fibre from the bark is used for making net bags.

Right: The leaves of Hibiscus manihot, a small bush found throughout Melanesia, are cooked by the islanders as a green vegetable.

Left: Setaria palmifolia growing in a native garden in the Morobe District of New Guinea. Right: Preparation of Setaria palmifolia shoots for cooking. Markham Valley, New Guinea. In some parts of the Philippines the seeds of this plant provide a substitute for cereals.

is green, the other purple. This plant is propagated by cuttings.

The green vegetable most characteristic of Melanesian garden crops, including those of New Caledonia, is a small bush, *Hibiscus manihot*, L., common throughout the area. A great number of horticultural varieties of this plant are known and identified by the shape of their leaves, which may vary from almost entire to finely digitate. This hibiscus is easily grown and is propagated by cuttings. Since the advent of the Europeans it has been introduced in some Polynesian islands—the Cook Islands, in particular.

Its introduction into the islands where it is not yet known is highly recommended. The leaves are cooked as a green vegetable. This plant is known as "aibika" in New Guinea pidgin and as "bele" in Fiji.

Flowers And Bark

It is again in Melanesia, from New Guinea to the New Hebrides (but not in New Caledonia), that the islanders eat considerable quantities of the aborted inflorescences of a cane, *Saccharum edule*, Hassk. This tall grass is generally cultivated and propagated by cuttings. A similar plant is used in the same way in Fiji, where it is known as "duruka". The identification of "duruka" is still a controversial point; according to some authors it is *Saccharum edule;* others see in it a related plant, *Erianthus maximus*, Brongn.

Saccharum edule is known in the New Hebrides pidgin as "na viso", and in New Guinea pidgin as "pit" or "pit pit". The inflorescences are eaten either roasted or boiled. It is an excellent vegetable, equally appreciated by Europeans.

In New Caledonia the islanders sometimes still eat the "bark" of a tree commonly found in all South Pacific islands, *Hibiscus tiliaceus*, L. In the past the utilization of its young shoots as greens had been recorded. The way in which it is used in New Caledonia, however, is much more peculiar; it is, in fact, the bast of the trunk or branches that is eaten. An accumulation of reserves in this sapwood is stimulated by ringing the trunk or a large bough. Six months later the sapwood has become considerably thicker and the tree, or branch, is felled and cut into sections. These are boiled, peeled and then beaten in order to separate the sapwood from the wood. The islanders chew at length on these fibrous masses, which have a pleasant taste, rather reminiscent of the European chestnut.

Mangroves occupy considerable areas in the coastal zones of many high islands in the Western Pacific. Sometimes, as in New Guinea or in the Solomons, some communities live within these mangroves. Agricultural possibilities in these areas are practically nil, so that the people subsist on fishing, foraging, and barter with people living in more favoured areas inland.

Among the forage plants characteristic of these formations must be mentioned certain mangrove trees whose food value is seldom known to Europeans. These are *Bruguiera*, especially *B. sexangula* (Lour.), Poir., and related species. The seed germinates while still on the tree, and it is actually the embryo which is the edible part. The fruit is peeled and the embryo grated and given a protracted washing in water, in which it is soaked overnight. It is then cooked and eaten, often with coconut cream. In the Loyalty Islands the embryos are dried and preserved.

We have noted the use of this food not only in Melanesia (New Guinea, Solomons, New Caledonia and the Loyalty Islands), but also in Micronesia, in Yap and in the Palaus. Similar uses have been reported from Malaysia, Annam and the Moluccas.

* * *

These notes give only a brief description of food plants used by the islanders, which sometimes remain little known. Further information will be found in the publication mentioned in the footnote appearing on page 17.

Rammed Earth Construction

(Continued from page 16)

essential, however, that the surfaces provided should be washable and resistant to normal abrasive wear.

Essential Equipment

The essential equipment consists of a corner mould, a straight mould, and at least two rammers of between 14 and 18 pounds in weight.

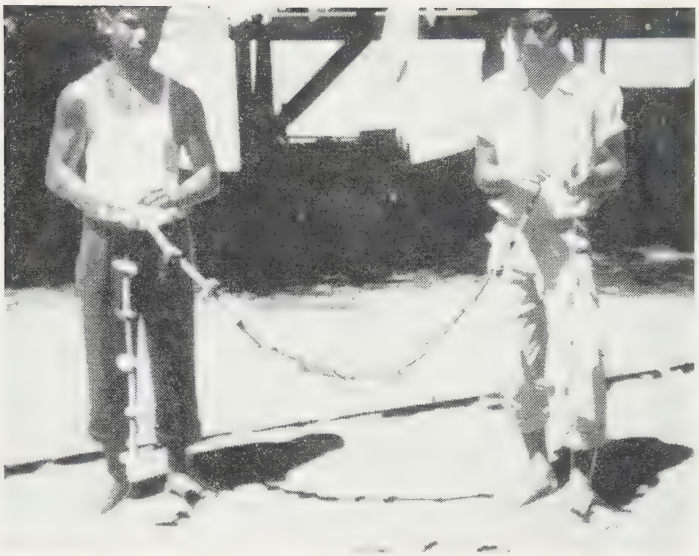
The moulds and rammers can be shaped and fitted by any average carpenter or handyman; the metal parts require the services of a blacksmith. However, in places where the metal and smith are not available, the connections can be made by wooden bars tenoned into mortices in the shutters and held firm by simple fox wedges.

No scaffolds and no more than ordinary tools are necessary.

Melanesians eat considerable quantities of the edible inflorescences of the cane Saccharum edule, shown here displayed for sale, with coconuts and shell fish, at a native market. Lae, Morobe District, Territory of Papua and New Guinea.

Right: Collectors made of dead oyster shells strung on galvanized wire and spaced by small sections of bamboo.

Below: Live oysters clustered on a collector. In the Philippines, cultivated oysters grow to lengths of 5"-6" in a year.



Oyster Farming

Under suitable conditions, large, fast-growing edible oysters, regular in shape, can be grown easily and cheaply. This article describes the simple technique used by oyster farmers in the Philippines, where conditions for oyster cultivation are similar to those found in many parts of the South Pacific.

By H. VAN PEL*

EDIBLE oysters are not cultivated in the South Pacific Commission area, although they are gathered in many places from the rocks or the mangrove roots on which they grow naturally. In most cases these oysters are misshapen or even stunted, often because they were too crowded on their supports, in other cases because the food supply is not adequate, sometimes because they have grown at an unsuitable level. Whenever it finds itself in a naturally suitable environment, the oyster grows well.

The nearest countries where oyster cultivation is practised are Australia and the Philippines. It is also an extensive industry in Europe, the United States, Africa and Japan.

The main difference between wild and cultivated oysters is that the former grow on natural supports, while the latter grow on artificial supports (cultch) on which they can develop to full size and from which they may even be removed at a certain stage to be placed onto another type of support.

Oyster eggs are fertilized immediately after they are released. In 24-30 hours, each fertilized egg turns into a free-swimming larva which feeds on nannoplanktonic material, the finest kind of plankton in the sea. A minute shell is soon being developed. In about fourteen days, depending on environment, these oyster larvae attach themselves to suitable supports, and become "spat". Once attached, the spat grow a much heavier shell. If left undisturbed, they will reach adulthood in the same place.

Oysters feed by straining water through their gills. The particles of food retained are then conveyed to the mouth of the animal by some movements of the palpi. The gills are important organs, used for breathing, straining food and removing waste products from inside the shell. Oysters feed on the minute algae and animals which constitute the plankton.

Every female oyster produces thousands of eggs, but many of these never become full-grown oysters. The mortality is very high, especially during larval life and immediately after the spat has settled onto its support. Even adult oysters have a number of enemies, such as starfish, fish, carnivorous molluscs and worms

The maximum life span of edible oysters is not known definitely. However, observations have been recorded on individual oysters over periods of ten years.

Selecting A Suitable Site

For oyster cultivation one should select a sheltered place near some river mouth, where the salinity will be low and the water turbid, preferably where oysters already grow spontaneously. If there are no oysters available in the area some can be transplanted, though such a move should never be attempted without expert advice.

There is a wide choice of methods for oyster cultivation, depending chiefly on local circumstances, available skills, etc. Since we have to deal with a tropical environment and skilled oyster farmers are not available, the Philippine method is considered more suitable, as it can be used on any scale from a very small enterprise to a large commercial "park".

In the Philippines, oysters are grown on collectors hanging either horizontally or vertically from wooden or bamboo racks, at the best growing level. This

* Fisheries Officer, South Pacific Commission.

An oyster farm in the Philippines.

level may vary noticeably from one place to another and has to be determined for each separate locality. Oysters growing on mangrove roots or on rocks often give useful indications in this respect, but it is preferable to rely on the growth of oysters on some object away from the shore.

The prospective oyster farmer will therefore have to select a suitable site, as described above, near mangroves, or in a side arm of an estuary, or in a sheltered bay.

Let us assume, for instance, that the difference between the levels of the highest and lowest tides in the place selected is five feet and that the depth at low water, springtide, is two feet.

A trial rack should then be built, as shown in the illustration. It is preferable to place the lowest collector 1′ 4″ above bottom, the highest 1′ below high water level, springtide. The depth zone in which oysters grow best will be found between these two levels.

The oyster farmer must then wait until spat begins to settle on his collectors. This may happen from a few days to a few months after the rack is installed, depending on the spawning season of oysters in the locality. The level at which the spat settles should be carefully noted and more racks can be built if desired, without waiting for the final results. Care should be taken, however, to set the collectors at the proper level.

In this case, collectors are made of dead shells about 5″ in diameter, strung on No. 8 or 10 galvanized wire and spaced by means of small sections of bamboo 4-5″ long. Anything solid can be used for collectors, even old tin cans or worn-out rubber tyres; however, the former rust quickly, while the latter may impart a somewhat unpleasant taste to the oysters. It is therefore preferable to use the valves or shells of sea or freshwater molluscs.

Movable Collectors Essential

The collectors must be movable. In the Philippines, this is achieved by hanging the horizontal type from two wire staples driven into the upright timbers of the rack, while vertical collectors are hung from the horizontal stringers by a single staple.

I have seen from ten to fifteen oysters in a cluster on one single dead shell. However, too many oysters in a cluster will hamper each other's growth and, after a few months, the largest are removed and placed on trays made of wire netting or plaited bamboo strips. Trays 6′ long by 3′ wide would be easy to handle. These trays are placed on racks at the proper growing level and the oysters are spread out on them in a single layer, leaving abundant space between the shells so that they can grow well and take a regular shape.

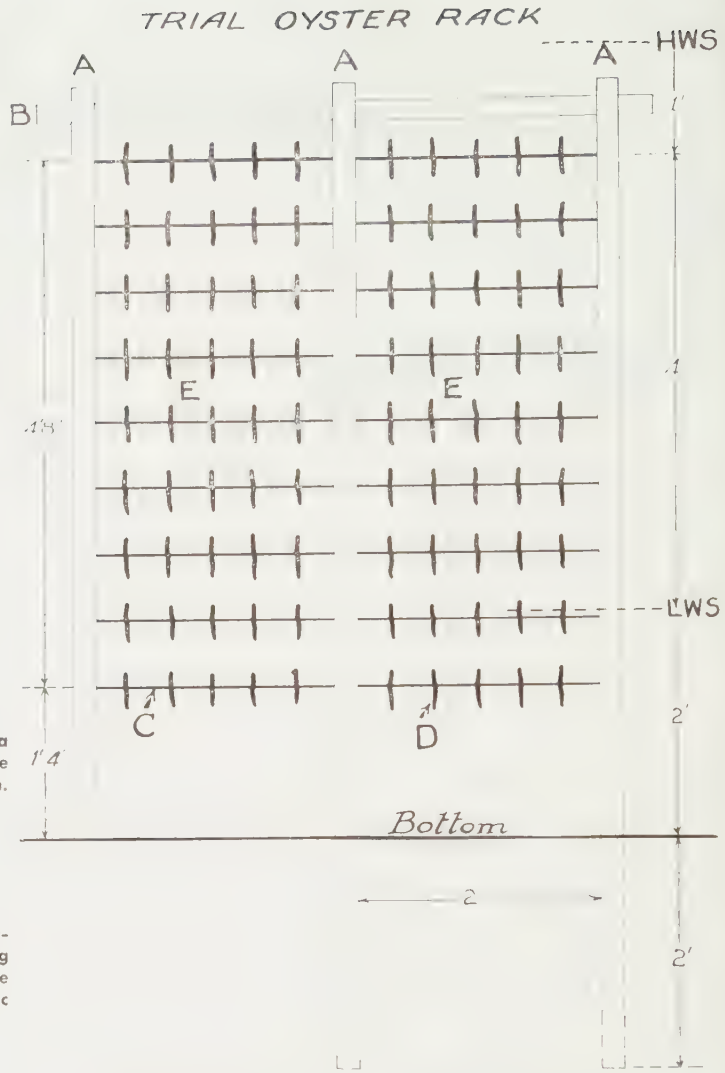
Since the oysters grown according to this method are placed in the most favourable environment, they grow much faster than under most natural conditions. In the Philippines, cultivated oysters reach a length of 2″ at three months, 4″ at five months and 5″-6″ at one year.

Bamboo or some other suitable material for the racks can be found easily in most South Pacific islands, and the method described here is not expensive. I would advise anybody who has a suitable site at his disposal to build a trial rack. If the indications are good, this rack can be expanded into a whole battery of racks, forming a "park" of the desired dimensions, on which the collectors can be hung both vertically and horizontally between the timbers.

REFERENCE: BLANCO, G. J., and MONTALBAN, H. R. *Scheme of Oyster Farming in the Philippines, Manilla, Department of* Agriculture and Natural Resources, 1952.

Details for building a trial oyster rack are given in this sketch.

Bamboo or other suitable material for making the racks can readily be found in most Pacific islands.

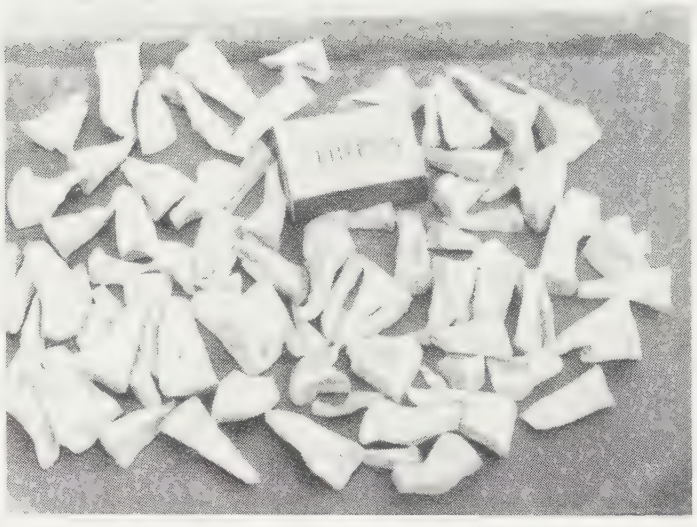


Breadfruit Drying in the Reef Islands

*In the Reef Islands, dried breadfruit is a valuable food standby when staple root crops are short. In times of plenty it is eaten as a biscuit or made into soup, and as well it forms an important item of trade with people of nearby islands. The method evolved by the Reef Islands people for the drying process is described below.**

By J. L. O. TEDDER

District Commissioner, Eastern District,
British Solomons Islands Protectorate.



Sun-dried breadfruit from the Reef Islands.

THE Swallow or Matema Islands, commonly called the Reef Islands, lie forty miles to the north-east of Ndede, main island of the Santa Cruz Group in the British Solomons Protectorate. The Reef Islands consist of two large islands, Lom Lom (five miles by three miles), and Fenualoa (seven by one mile) of elevated limestone with numerous sand flats and isles, none exceeding sixty feet above sea level. There are several smaller islands to the north and west such as Nupani, Nukapu, Pileni. Matema, which are of coral debris and sand within reefs.

These islands support a population which last year (1955) numbered 3,300, most of whom live on Lom Lom and Fenualoa. The diet of the islanders consists of yams, sweet potatoes, coconuts, pigs, fish and breadfruit.

During the months of October-November, the rather large breadfruit crop is harvested by family groups who often go and camp in garden houses while the picking is done. It is impossible for these people to consume all the breadfruit while it is fresh, so a system of drying has been evolved.

The Drying Process

The ripe breadfruit of all varieties are cooked in the ashes of a fire for about an hour, as is normally done when eating them fresh. The fruit is then left for a day before it is peeled, cut into quarters and the seed and seed packing removed. The fruit is further divided up into segments with a small knife.

Meanwhile, a hole has been dug some two to three feet in diameter and a foot deep. In this hole a large fire is made with good smokeless firewood and large stones are heated. Generally these stones are of coral limestone, but every ship returning from Vanikoro brings back basic rocks for this purpose.

When there is no smoke arising from the red coals and hot stones, a net (for this size of fire about six feet square) woven from the inside of the roots of the bush pandanus, is placed three or four feet above the fire. On top of this net the breadfruit segments are placed to a depth of four or five inches.

As the fire and stones cool, the net is moved lower and the fruit segments are turned continuously. At the end of six hours the fruit is ready.

Coconut baskets (two to three feet in diameter and one foot deep) are woven and dried in the sun. Leaves of the "nealombu" (Reef Islands language, scientific name not known, and seemingly not present in the other Solomons) are picked and sun-dried. Breadfruit leaves are also used for this lining purpose.

The leaves are heated by the fire and the baskets are lined with them. The hot breadfruit is placed inside and with the leaves serving as walls, built up to a foot above the basket top. Well covered with more leaves, shaken down, the baskets are sewn up with bark and the breadfruit biscuits are then ready.

The "nambo" (Reef Islands language) or breadfruit biscuits are kept on racks above the kitchen fire, where they will keep for twelve months or more, but the writer has kept a basket on a verandah for over three months without deterioration in quality.

Breadfruit, most characteristic food crop of the South Pacific. To many Europeans the breadfruit tree is the symbol of abundance and easy living in the South Sea islands.

* This article is published partly in response to an enquiry for information on methods of drying breadfruit, made at the Third South Pacific Conference held at Suva in April.

Valuable As Food Standby And Item Of Trade

This food provides for the people of Lom Lom and Fenualoa a valuable standby for famine times when the staple root crops are short. In time of plenty it is always eaten as biscuits with fish or meat; for the old people, it is made into a soup and it forms an important item of trade with the Pileni, Nukapu, Nupani and Matema peoples, whose barren islands do not produce such breadfruit and hardly any root crops, and who use breadfruit as a secondary staple to coconut. Europeans find the biscuits quite pleasant and use them in curries.

Baskets of breadfruit biscuits averaging between thirty and forty pounds in weight sell for five to ten shillings each, depending on the season's supply. During November and December the large ocean-going outriggers or tepukes carry cargoes of this breadfruit to the Duff Islands, Nupani and Ndede for sale.

The practice of drying breadfruit in this manner is also followed to a certain extent in eastern Ndede, the Duff Islands and Utupua.

(*Author's Acknowledgment*: This article was prepared with the help of Walter Togonu, a clerk whose home is in the Reef Islands.)

Analysis of Dried Breadfruit

Mr. F. E. Peters, Biochemist, South Pacific Commission, supplies the following notes on the results of analysis of the dried breadfruit described above:

A sample of the dried breadfruit, prepared by the method given above, was sent by Mr. Tedder to the Commission's laboratory in Noumea for analysis. On arrival, the sample was found to be composed of chips ¾" in length, having a cream colour and a palatable flavour.

The composition of the breadfruit is shown in Table 1, together with some values obtained for fresh breadfruit.

TABLE 1

	DRIED	FRESH
Water	8.0%	80.0%
Ether extract (fat)	2.1%	0.5%
Crude fibre	4.7%	1.2%
Nitrogen	0.68%	0.12%
Protein (NX6.25)	4.3%	0.75%
Ash	4.2%	0.75%
Starch	72.0%	12.0%
Calcium	440 mg.%	30 mg.%
Phosphorus	130 mg.%	28 mg.%

Nutritionally, the dried breadfruit is a good food. It is composed mainly of starch, but its 4% protein content does give it some balance, and it is a fair source of calcium.

It was observed that on keeping the dried breadfruit exposed to air for two months, the water content increased from 8% to 12%. The water content is critical in the keeping qualities of a food, and the lower the water content, the better the keeping qualities. The practice of storing the dried breadfruit on racks above the kitchen fire is to be commended, for this will ensure that the moisture content is kept low by the passage of dried air around the baskets.

Side-Bearing Banana Tree

TO THE EDITOR

Dear Sir,

The enclosed photo may be of some interest. I lived for many years in Queensland and have been in New Britain for five years, but do not remember having seen a bunch of bananas growing from the side of a corm. This was rather a small bunch, not very big fruit but of excellent flavour—the first bearing.

At some stage, could you please include a paragraph in your most helpful magazine as to what causes, and whether there is a preventative or cure for, the brownish black scale that affects some of the fruit.

Yours, etc.,

(Mrs.) Florence A. Ryder.

KOKOPO, NEW BRITAIN.

In reply to the above correspondent, Mr. Jacques Barrau, Subsistence Agriculture Officer to the South Pacific Commission, writes:

"With regard to your photograph (reproduced below), I wish to advise that what you call the 'corm' is not a true stem, but is formed by the sheathing leaf-bases growing together. The true stem is the underground rhizome.

"The pseudo-stem formed by the assembled leaf-bases has a narrow channel in its centre through which the inflorescence bud is thrust upward from the underground rhizome under very strong pressure. If, for some accidental reason, there is a weak point in this narrow central channel, the bud, instead of reaching the crown of the plant, pushes through the weak point at the side of the pseudo-stem. This happens sometimes when the plant has been shaken by strong winds before flowering, but many other factors can produce the same results.

"Concerning the 'brownish-black scale that affects some of the fruit', the trouble cannot be identified without a more complete description.

"Damage of the type shown in the accompanying sketch is due to the 'banana scab'

moth. The caterpillars of this moth, *Lamprosema* (*Nacoleia*) *octasema*, Meyrick, eat the skin of the very young fruits, leaving corky brownish scars.

"This damage could be controlled quite easily by dusting the young bunches with DDT or rotenone powder. During trials made in New Caledonia, by the Entomology laboratory of the French Institute of Oceania, dusting with 5% DDT powder or 2% Rotenone powder was equally effective."

Commission Awarded Diploma For Health Education Material

THE International Union for Health Education of the Public has recently held its third Conference in Rome, the previous Conference being held in Paris in 1953. At the recent Conference there was a display of Health Education material published by the Commission, and the Conference authorities were pleased to award a Diploma of Honour (1st Class) in respect of this display.

This international recognition of work in this field is much appreciated. Most of the credit for the production must go to Dr. G. Loison, until recently Research Officer for Health, to Mrs. Nancy Phelan, to Mr. Bruce Roberts, and the workers in the Visual Aids Section and Literature Bureau who were chiefly responsible for the detailed production of the material.

There is no doubt that the Commission is in a position to give great assistance to territories in producing materials for use in health education work. Here as elsewhere of course finance is often the trouble, but in partnerships between territories and the Commission, much could be done which neither could do alone. Progress in health education seems greatest where territorial budgetary provision is made under this head, and there is regard for the fact that costs of prevention of sickness are very small when set against the costs for care of those who suffer illness.

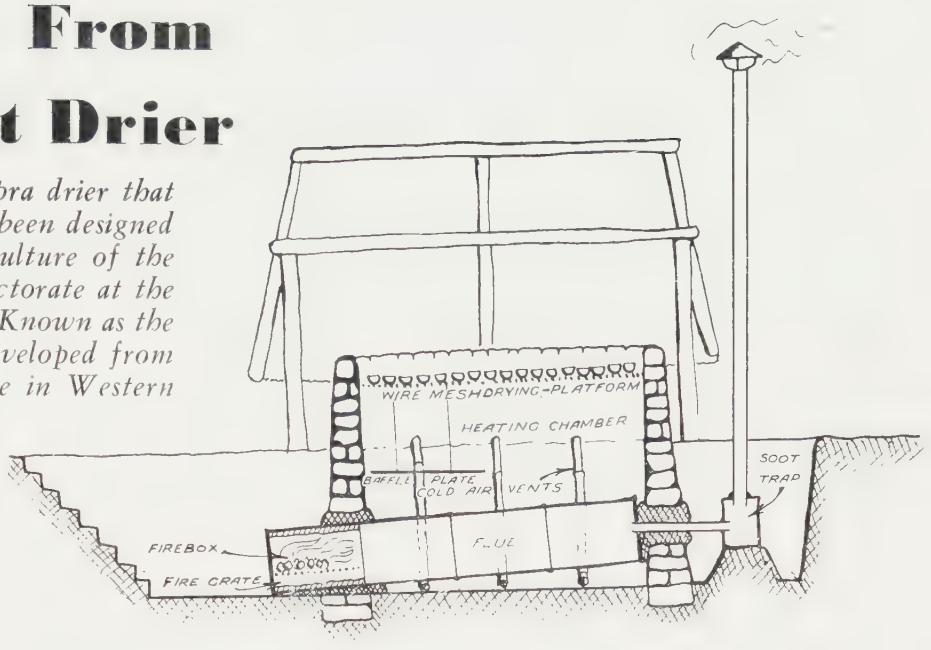
The Commission has its Diploma for work done for "the Health Education of the People". The Commission believes that what is done will make the people healthier and so happier. This is its purpose.

PICTURE CREDITS

Acknowledgement is made for photographs reproduced in this issue as follows: Front cover and pages 7 (top), 9 (top right, bottom left and right), 10, Stinsons Ltd., Suva; pages 6, 7 (bottom) and 9 (top left), Caine's Studios, Suva; page 25, New Zealand Tourist and Publicity Department; pages 33, 40, 41, Australian Official.

Better Copra From New Low-Cost Drier

A small, low-cost, hot-air copra drier that is giving excellent results has been designed by the Department of Agriculture of the British Solomon Islands Protectorate at the Kukum Agricultural Station. Known as the Kukum copra drier, it was developed from the Martin cocoa drier in use in Western Samoa.



Schematic cross-section sketch of the Kukum drier.

CHEAP to build and easy to operate, the Kukum drier has proved very successful. To encourage its use the Copra Board of the Protectorate is making available to producers the fire-box and heating-drums, etc., at cost (about £A.23). The house, heating chamber and cooling "benches", etc., are made by the buyer with the assistance of specially-trained staff, cost being in the region of £50 to £100, depending upon the building.

Officers of the Department of Agriculture, as well as District Commissioners and District Officers on tour, are doing everything possible to encourage producers to instal Kukum driers. Headmen are taken to inspect the Department's driers in operation. Two European officers have been engaged almost exclusively for 18 months in supervising the siting and erection of the driers—a task that has now been taken over by native staff specially trained for the purpose.

Grading At Ports Of Shipment

Copra is shipped from the Solomons through the ports of Honiara, Yandina and Gizo. In each, grading is carried out under the supervision of a European expert, assisted by islanders whom they have trained, and who have proved very reliable. A chart (reproduced on p. 24) is used to determine grade.

The Kukum drier produces first-grade copra, and to popularize its use the price differential between first and third-grade copra has been widely stressed.

Constructional Details

The unit consists of a heating chamber closed on four sides, through which passes a sealed flue of 2′ in diameter (welded petrol drums), surmounted by a wire mesh drying platform 7′ x 9′. The platform is 7′ above the floor of the chamber, or 5′ above the top of the flue. The cold air vents, 3½″ in diameter, are placed three on each side of the chamber which carry cold air, venting it near-to, and almost under the hot-air flue.

The outside fire-box consists of a used petrol drum lined with a cement/lagging mixture about 1½″ thick. This is joined to the main flue by packing with a clay-mortar mixture in the wall of the chamber. It can be removed without disturbing the chamber or the welded flue. A fire grate, consisting of a short section of used airfield matting, supported by short sections of angle iron, is placed in the fire drum to maintain combustion.

At the extremity of the flue (the bottom of the end drum having been retained) a 3′ section of 6″ diameter galvanised iron pipe is joined in the wall of the chamber with clay-mortar mixture. This horizontal section leads out of the chamber into a small 4-gallon drum, which serves both as a soot trap and as a base for the 12′ vertical chimney of 6″ diameter galvanised pipe.

The chamber may be built of any suitable material, but it must be well constructed so that the ingress of cold air is only through the vents provided.

A baffle plate, consisting of a flattened-out second-hand petrol drum, is suspended near to the fire end of the flue and about 18″ above the flue. The most suitable position is found by trial and error method.

At Kukum the chamber is half below ground level, mainly to reduce cost of construction, and so that the platform is easily accessible from ground level.

Operation

To gain access to the heating chamber for periodical cleaning—which is necessary when the drier is *not* in use, to reduce fire risk—a small, well-fitted wooden door is provided. Over all, excepting only the chimney, a native-type leaf house is built. This should be as large as is reasonably possible with due regard to accessibility, light and protection from the weather.

Normally the husks and shell will provide the bulk of the fuel required, but some clean dry firewood may be necessary and should always be on hand.

The successful operation of the properly-constructed drier depends mostly upon maintaining a steady, free-burning fire, avoiding too fierce a fire and no fire at all. The commonest fault by attendants is to overload the fire-box with fuel, thus choking the fire and getting little or no heat through the flue.

Due to the force or direction of the wind, the position of the baffle plate, the nature of the fuel, or the rate of combustion, "cold" spots may be noticed on the platform; this will generally be rectified by correcting obvious faults.

The copra on the platform should be moved around from time to time by use of a wooden rake, or by hand if half-nuts are being dried.

The normal time for complete drying on this size of drier with a full charge of 1,000 husked half-nuts is 22 to 28 hours.

To Make High Grade Copra

Apart altogether from the method of drying, i.e., reducing the water content of the coconut meat to between 6 and 8 per cent. (and without going into the reasons) the following precautions should be observed:

BEFORE DRYING: Coconuts used for copra should be fully matured—neither

B.S.I.P. DEPARTMENT OF AGRICULTURE: COPRA GRADING TABLE

Average Colour		Cleanliness		Condition		Smell		Dryness	
White	4	Very clean	4	Large round thick smooth	3	Sweet	4	Pearly lustre, biscuit hardness, 6 per cent. or under.	5
Grey or pale brown	3	Slightly dirty slightly smoked	3	Small irregular thin	2	Slightly smoked slightly rancid	3	Breaks with dull snap. Dark pearly lustre, 6 to 7 per cent.	4
Brown	2	Dirty mouldy smoked	2	Very small very irregular very thin dusty	1	Smoked rancid smell of green copra	2	Bends in breaking with dull thud, faint water line, 7-8 per cent.	2
Dark brown	1	Very dirty very mouldy very smoked	1	Rubbery torn distorted shapeless	0	Very smoked very rancid	1	Soft rubbery—distinct water line, 8-9 per cent.	1
Reddish black black	0	Rotten charred	0			Very rancid burnt	0	Soft spongy, rubbery. Meat showing whitebreak, 9-10 per cent.	0

Improve the quality of your copra by the use of this chart (half marks may be used when considered necessary).

FIRST or B.S.I., H.A.D. GRADE ..... 80 and over
SECOND or B.S.I., MIXED F.M./H.A.D. GRADE 60-79
THIRD GRADE or B.S.I.F.M. 45-59
UNDER 45 TO BE REJECTED FOR EXPORT.

Example: Colour 2, Cleanliness 3, Condition 1, Smell 2, Dryness 4 = 12 × 5 = 60 marks. Defective matter 10 ÷ 2 = 5. Therefore grading equals 60 — 5 = 55.

DEFECTIVE MATTER: This means copra which in the opinion of the Inspector is defective by reason of being badly moulded, insect attacked, burnt, immature, rotten or decomposed and will include also "extraneous matter", which means any matter which is not copra and includes shell, dust, dirt, stones, etc.

FIRST or B.S.I., H.A.D. grade copra would consist only of Hot Air or sun dried copra.

SECOND or B.S.I. mixed F.M./H.A.D. would include slightly inferior H.A.D. or sun dried and the best smoke dried.

THIRD grade would include all inferior copra, still fit for export.

immature (i.e., "green") nor overmatured (i.e., germinated).

The "meat" should be subjected to the drying process as soon after the nut is opened and the meat exposed to air and contamination as possible. The ideal time would be less than half an hour—time only for the "free" water to drain off.

AFTER DRYING: Spread hot or warm copra on a wooden floor if it cannot be left on the drier platform to cool off. Never heap up and leave the copra while it is hot.

The copra store should have a raised floor of wood, split betel palm or split bamboo. After thoroughly cooling the copra may be safely heaped up to any height for storage. Copra keeps better if stored in bulk on a raised floor under clean, weatherproof conditions.

Bagging of copra should be delayed until the copra is about to be shipped. Batches of copra known to be inferior in quality should be stored and subsequently bagged separately. It should be branded so that it will be submitted to the Copra Inspector for grading separately from the known high-quality copra. The drier and the copra store, and their surroundings, should be kept clean and free from domestic animals and poultry.

Grades Of Copra: Official Definitions

For the information and guidance of producers, the Department of Agriculture has published the following definitions of the various grades of copra*

GRADES OF COPRA

The grades of copra suitable for export shall be as follows:—

1. British Solomon Islands Hot Air Drier Grade (B.S.I.H.A.D.) is copra which, in the opinion of an inspector, is generally composed of thick, smooth pieces, light grey to white in colour, sweet smelling and free from odours of smoke, rancid oil or mould, breaking with a clean sharp snap to show a clear grey pearly lustre. This grade is perfectly clean and free from all extraneous matter, and does not contain more than one per centum by weight of defective matter.
2. British Solomon Islands Mixed Fair Merchantable and Hot Air Dried Grade (B.S.I. Mixed F.M./H.A.D.) is copra which, in the opinion of an inspector, is not of sufficiently high quality to justify its grading as B.S.I.H.A.D. grade, but which is superior to the B.S.I.F.M. grade. This grade is well dried, does not have a strong odour of smoke or rancid oil, and does not contain more than five per centum by weight of defective matter.
3. British Solomon Islands Fair Merchantable Grade (B.S.I.F.M.) is copra which, in the opinion of an inspector, is not of sufficiently high quality to justify its grading as B.S.I. Mixed F.M./H.A.D. grade, but is suitable for export. It should not contain more than ten per centum by weight of defective matter.

Campaign Produces Encouraging Results

The Department's campaign to encourage production of higher quality copra throughout the Solomons is meeting with encouraging results. A definite improvement in the quality of copra offered has already been noted.

* Extracted from **The Copra Regulations 1954**, and **The Copra Rules 1954**.

Third South Pacific Conference

(Continued from page 10)

from scientific and literary works, geography and history, and the many aspects of the daily life of the Pacific peoples, and the common features of their civilization.

The publication of booklets in the vernacular on such subjects as cocoa and coffee production was also recommended.

Already, the South Pacific Commission has published successfully an illustrated booklet, *Wealth From The Coconut*, in six Pacific languages and in English and French.

The Conference lasted from April 23 to May 3. It concluded with an afternoon of traditional Fiji singing and dancing. In the evening of the last day, an informal concert was organized by the delegates. At this concert, students of the Teachers' Training College danced, sang a contribution to a successful social function which was much appreciated, especially as the girls and youths had contributed to the smooth working of the Conference by acting as messengers and helpers in the dormitories and recreation rooms.

The Grasses of Fiji

(Continued from page 13)

mended to anyone interested in the grasses, not only of Fiji, but of the Pacific islands generally. The foreword states that similar accounts of the legumes and the weeds of Fiji are in preparation; it is to be hoped that their appearance will not be long delayed.—H. S. MCKEE.

Economic Survey of Western Samoa

In 1953, an economic survey of Western Samoa was undertaken, with Commission assistance, by Mr. V. D. Stace, Assistant Economist to the Reserve Bank of New Zealand. His report on the project, which has been published in the Commission's Technical Paper series (No. 91), is reviewed

by C. DOWSETT*

Right: Bananas being packed at a contractor's "depot". This is one of the many illustrations appearing in Mr. Stace's report

THIS Technical Paper is a particularly interesting and valuable addition to the published results of research and advisory work undertaken or sponsored by the South Pacific Commission.

The economic survey of Western Samoa was undertaken in 1953 at the request of the New Zealand Government with the hope that it would "indicate the extent to which the resources of the territory are adequate, or adequately utilized, to provide for the maintenance and improvement of present living standards for the rapidly expanding population". Western Samoa's population, 68,000 in 1945, is now 97,000 and forecast to reach 184,000 in 1975. Stace's report, originally written in 1954, was revised by him late in 1955 to include later statistics available.

Although in many respects this Technical Paper is more in the nature of an initial economic and social "stocktaking" than an economic survey in the generally accepted sense, it does, nevertheless, constitute a comprehensive basis for more detailed work in a number of fields.

Logically, any programme of economic development requires to be based upon a careful appraisal of available resources, their present and potential utilization, the economic and social pattern of community life, and its significance in relation to current population and production trends. The assembly of such information, in a sufficiently detailed and precise form, is a difficult enough task in the more advanced communities. For a relatively primitive and underdeveloped community such as Western Samoa, the lack of information is often a major handicap for both economic planning and general administration.

Stace has not only dealt with the relevant information which is available, but he has also made valuable suggestions (which are supplemented by the Deputy Chairman of the Research Council of the Commission in Appendix 4) as to the deficiencies that exist in present knowledge and how they may be remedied.

In many ways, the situation in Western Samoa is not so very different from that in the other dependent territories in the South Pacific. Thus, this "economic survey" could materially assist other governments and administrations in their appreciation of the present situation and the lines along which future action might be directed.

The major part of Stace's report comprises an analysis of present information on population, land and other material resources, agricultural production, manufacturing and service industries, employment and wages, public finance, trade and external payments, currency and banking, social services. Following this "cataloguing" of data available, an important section, "Agriculture and Economic Progress in Western Samoa", endeavours to assess the overall position where, Stace concludes, "there is no reassuring evidence of recent material progress . . . Advances in public health, education and political development during recent years are most impressive and certain to provide increasing beneficial influences on the economy if they are maintained and integrated with parallel advances in the other important fields of development. . . . In its fertile soils, its favourable climate and its healthy and intelligent people, Western Samoa is richly endowed with potential resources to provide a much higher standard of living for a very much larger population. At the present time, notwithstanding their rich endowment, the great majority of the Samoan people are well fed but poor. . . . The general standard of living in the territory can rise consistently only if the stock of productive capital rises at a greater rate than total population, and if those operational changes occur which improve the efficiency of Samoan labour or the territory's capital and industrial organization. . . . In the long run . . . Western Samoa's standard of living and its economic, social and political well-being are all bound up with the problem of improving the general standard of productive efficiency."

One cannot but be most impressed by the fact that in Western Samoa, as in many other South Pacific territories, the problems are not so much those of adequacy of natural resources for future development and an increasing living standard, as those of "mental attitudes" among the dependent peoples themselves. In this regard Stace comments that "most of the problems . . . are not peculiar to Western Samoa. They are problems of non-materialistic, semi-feudalistic societies, where the people's lives have been changed suddenly and profoundly by progress in public health, education and public security, without complementary changes in social organization or economic life. The impact of these new social services invariably results in population growth and ambitions for individual and collective progress incompatible with the non-materialistic standards and methods of the traditional social organization."

There is evidence that the Samoan traditional institutions and mental attitudes are in transition, but the problem is sufficiently important to lead Stace to recommend an objective examination of these customs and attitudes in relation to the problems of economic development.

Overall, this Technical Paper is a most valuable contribution to the primary function of the Commission—to recommend to member Governments means for promoting the well-being of the peoples in the South Pacific island territories. The Commission, and Mr. Stace, are to be congratulated on the completion of a pioneering project which will undoubtedly exert a strong influence on current thinking in all sections of administration concerned with formulating and implementing economic and social policies for dependent territories.

* Economist, Rural Bank of N.S.W., Australia.

A general view of the main building of the Sale'imoana Co-operative Society Limited as it looked early in March 1956 after extensions had been made to the original building. The left-hand door leads into the office, that on the right into the retail store.

Sale'imoana Story....

The principles and possibilities of co-operative enterprises in the Pacific are well illustrated in this account of the birth and growth of the Sale'imoana Co-operative Society Limited, of Western Samoa. According to the author, so successful is this Society that it has become a model for those establishing similar organizations in the territory.

By R. BOYAN

Registrar of Co-operative Societies, Western Samoa

FOR many years air travellers to Western Samoa have been familiar with the sweep of bay and beach which fronts Sale'imoa village, twelve miles west of Apia. A big village, Sale'imoa is served by a number of trading stations which the travellers can observe along the main road. But it is only since 1954 that visitors have been able to see the buildings of the Sale'imoana Co-operative Society Limited.

As recounted recently by Time Tusagi, the secretary and one of the original sponsors of the Society, the first steps towards formation were taken by a small group of residents of Sale'imoa village who had not heard the word "co-operative," but who, after discussions among themselves, had considered it would be a good idea to have a group trading organization.

The decision to make cash contributions towards the project was made in 1953, and after twelve months enough money had been gathered to finance the construction of a small store building, a produce shed and a small, Samoan-style house for the manager. As a preliminary, the considerable reclamation work necessary at the proposed site was carried out by the members. Building materials were then purchased locally and a carpenter engaged. He acted mainly as foreman, the members themselves contributing the labour.

By September 1954 the buildings were completed, and there was some spare cash in hand. However, the leaders of the group considered this amount would not be adequate to finance full operations of the Society, which were to include copra and cocoa marketing and retailing, and an arrangement was made with one of the local companies for goods to be supplied on credit up to a specified limit.

Application For Registration

Several months earlier, the leaders of the project had called on the newly-arrived Registrar of Co-operative Societies for further information on the principles and operation of co-operative societies. After discussion, members had decided that their plans for operation were in accord with the principles explained to them. Then, when the buildings were completed an application for registration was submitted to the Registrar.

Accompanying the application was a list showing a total membership of 54 men and women. Also submitted was a detailed record of the expenditure on building materials, totalling £297/14/11. An estimate was also supplied of the value of work done by members in preparing the site and constructing the buildings.

It was decided that an amount of £416/10/1 would be allocated to members as shares in compensation. As the cash contribution totalled £933/9/11, the capital of the Society thus stood at £1,350, divided into 270 shares each of £5, with each of the 54 members holding 5 shares.

A Well-Run Enterprise

Registration was granted on 27th September, 1954, and the Society commenced operations immediately. Prior to the opening, various ceremonies were held in accordance with Samoan custom.

After little over three months of trading, an annual balance sheet was prepared in accordance with the requirements of the Co-operative Societies Ordinance. This disclosed excellent results, and an amount of £214/5/2 was distributed to members. Division of the amount was determined by each member's purchases from the store and the value of copra and cocoa sold by him to the Society. In addition, a sum of £165/16/10 was placed in the General Reserve Fund.

In the early part of 1955, turnover of the Society fell somewhat because of the failure of the mid-season cocoa crop, but the figures improved again, when harvesting of an excellent crop began in July 1955.

During the year the Co-operative Societies Regulations were altered to provide that trading and profit and loss accounts and a balance sheet should be prepared as at 30th November instead of 31st December. This year's accounts for Society again showed good trading results, and just before Christmas members received over £580 from the surpluses. In addition, a further amount of £205/19/- was added to the General Reserve Fund.

Members had to give consideration to the question of granting credit to themselves. Finally, they adopted the suggestion of the Registrar that each member be allowed a credit limit of one-quarter of his paid-up share capital.

Society Begins Operations

Financially the Society must be regarded as a success, but there are other features for which members and officers deserve commendation. The Society is well run in every respect; its welfare is

Above: On the office walls are hung bulldog clips holding duplicates of dockets for all purchases from, and all sales to, the Society. A member's number is painted on each clip. The dockets are totalled monthly, and a list of the totals displayed on the Society's notice board. This gives members an opportunity of totalling the originals which are handed to them at the time of the purchase or sale, and pointing out any errors of the office staff.

Right: A view of portion of the interior of the retail store showing the stocked shelves. Prominent on the left is that popular South Seas commodity, tinned beef. At the top right-hand corner is a notice showing the latest price for cocoa, viz. 110/- per 100 lbs.

watched carefully by the committee of eighteen, which meets frequently. The manager is very competent, while the president and secretary, who share the accountancy work, set a very high standard. Annual and special general meetings of members, held in the local schoolhouse, are well attended, and there is no lack of discussion. The relationship between the officers and the Registrar is very close, even though there is little need for advice and guidance from him.

The handling of the Society's finances is simplified because all payments, except those of petty cash, are made by cheque, and all income banked at regular intervals to the credit of a current account with the Apia branch of the Bank of New Zealand. Produce is bought from a special fund which is kept on the imprest system.

Office equipment includes a safe and a typewriter, and an adding machine may soon be purchased. A stock-taking is made every four to six weeks as a check against any leakages.

Strict Buying Standards

The Society is fortunate in having no transport difficulties. Produce can be moved easily and quickly to Apia by bus or truck, and store purchases can be taken to Sale'imoa by the same means.

The Society endeavours to observe strict standards in the buying of copra and cocoa, even though this has meant that, on occasions, members have diverted their produce to buyers who will purchase produce of a lower standard. The latest distribution of surpluses will probably eliminate such practices.

The practice of buying stock for the store on credit has long since ceased, and all such purchases are now paid for by cheque. All stock has been bought on a wholesale basis at Apia, but no one merchant has a monopoly of the Society's business.

Early in 1956 the Society's store building was enlarged. The original main building had been divided into two approximately equal parts, one containing the retail stocks, the other being used as an office. However, it was soon discovered that the retailing portion was overcrowded, and so the building was extended. This enabled a much better display of stocks and, in addition, living accommodation for the manager has been provided in the same building.

A Model For Similar Bodies

So successful is this Society that it has become a model for those establishing similar organizations. Managers and other officers of proposed societies have spent periods in the store or in the Society's office studying the method of working. In this way it is contributing towards the development of the co-operative movement in Western Samoa.

During 1955 the members took another step forward by sponsoring a society of the thrift and credit type under the name of "Moana Saving and Lending Co-operative Society Limited". The new co-operative has attracted members who do not belong to the Sale'imoana Society.

This development is probably the forerunner of other expansion. It is expected that either the Sale'imoana Society will extend its activities into other spheres or else members will form additional societies for specific purposes. The processing of green copra and wet cocoa beans is already under consideration.

Thus within only eighteen months of registration, the Sale'imoana Co-operative Society Limited offers a convincing example of the value of co-operation to the Samoan people. The plans of its members for the future will undoubtedly prove this to a greater degree.

So far the main value of the Society to members may be summarized as follows:

(i) Members have received trading surpluses which would otherwise have passed into other hands;

(ii) members receive dockets in respect of all purchases from, and all sales to, the Society, and thus know exactly where they stand;

(iii) members have derived prestige from the successful operation of their society; and

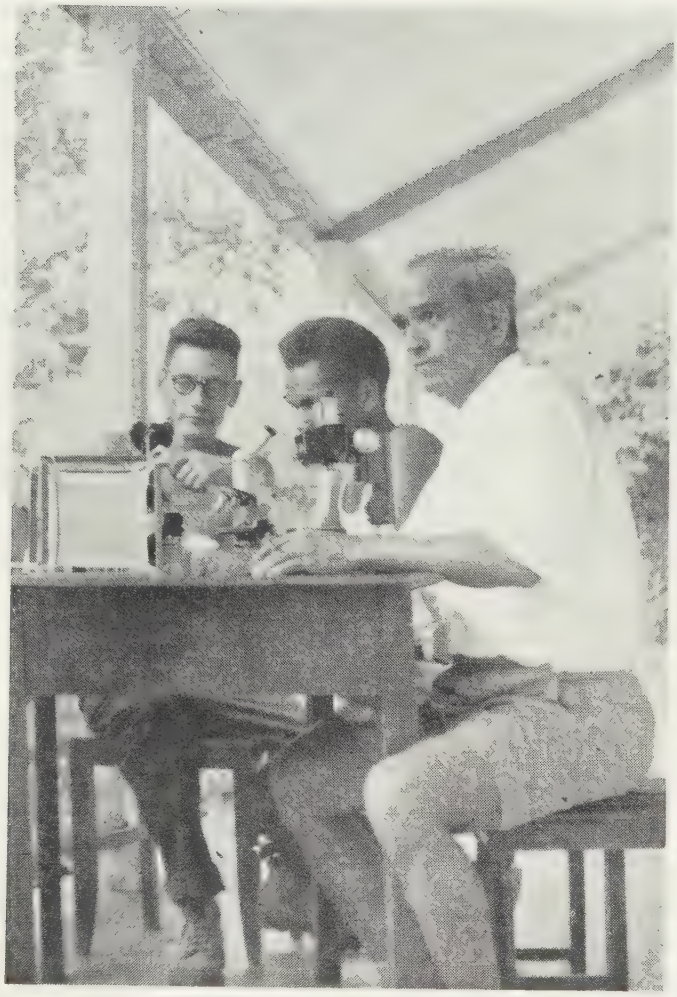
(iv) officers and others have received excellent training in financial management.

Fiji Annual Report

COPIES of the latest edition of the Fiji Colony Annual Report are available from the Government Press, Suva, price 4/6 each. The report covers in detail Colony affairs in 1954, and in addition provides a great deal of general information about Fiji. It is, in effect, a comprehensive handbook on the Colony. A map is included and there are four pages of photographs.

New Hospital For Hollandia

A NEW, well-equipped 300-bed hospital is to be built at Hollandia, Netherlands New Guinea. It will include a main central building, operating theatre, X-ray department, maternity ward and children's hospital.



1947 1956

Nine Years Of Service

To advise them on ways and means of promoting the welfare of Pacific islands peoples, the Governments of Australia, France, the Netherlands, New Zealand, the United Kingdom and the United States of America set up the South Pacific Commission in February, 1947. The Commission's main activities and accomplishment's in its nine years of existence are reviewed in the article below.

By IAN MacGREGOR

In the foreground is Dr. M. O. T. Iyengar, Commission specialist on mosquito-borne diseases, engaged in field studies of filariasis in New Caledonia. Dr. Iyengar's appointment to his present post resulted from recommendations that emerged from the conference on filariasis and elephantiasis, held under Commission auspices in Tahiti in August, 1951.

BRIGHT was the vision which during the immediate post-war years beckoned to nations to enter upon an era of mutual co-operation and goodwill. Even confirmed sceptics were prepared to be convinced that nations might act effectively in concert under circumstances other than those which threatened their joint existence as sovereign states.

However wise after the event the sceptical may have proved, the spurs to positive collective action were then sharp. Urgent problems of reconstruction and rehabilitation clamoured for solution, and the consciousness was awakening of the need for the peoples of the so-called under-developed regions of the world to be assisted towards better conditions of life.

To peoples who had seen the dark night of war dispelled in the dawn of peace, nothing seemed more challenging than the prospect opening up before them of a time in which their combined efforts could be devoted not only to improving their own lot, but also to helping others less favoured than themselves.

Such was the milieu in which a host of international agencies was called into being almost overnight. These organizations were at once overt evidence of the desire for co-operation and the instruments wherewith it might be realized. The function of some was to disperse, or if this were not possible, to assuage those post-war discontents which clearly required collective international action directed towards the total or partial removal of their causes. Others again were charged with longer-term projects in fields which had not previously been regarded as ones in which national interests might be served effectively on collective bases.

Strange would it have been indeed if something of the spirit pervading those years had not been reflected in the stream of events which led to the establishment of the South Pacific Commission nine years ago. In retrospect it appears even more remarkable that the Governments of Australia, France, the Netherlands, New Zealand, the United Kingdom and the United States of America, whose representatives agreed on 6th February, 1947, to set up the Commission, have been able to translate so much of their inspiration into practical politics.

The South Seas Conference

The signing of the Agreement establishing the South Pacific Commission was the concluding act of the South Seas Conference held in Canberra from 28th January to 6th February, 1947.

This Conference was convened by the Governments of Australia and New Zealand as a result of one of the intentions expressed in the "Anzac" Agreement between the two countries signed on 21st January, 1944. The enlightened policy asserted in this latter Agreement for the application of the principles of trusteeship to the peoples and territories of the Pacific was endorsed by all the nations represented at the South Seas Conference. The Rt. Hon. Walter Nash, leader of the New Zealand delegation, declared that one of the chief aims of the Commission was to end the exploitation of peoples of the South Pacific for the benefit of others outside that area, and to pool the knowledge of member governments in advancing the welfare of the island peoples.

The Agreement establishing the Commission refers to the desire of the participating Governments "to encourage and strengthen international co-operation in promoting the economic and social welfare of the peoples of the non self-governing territories in the South Pacific region administered by them".

The Commission thus established was one whose function was that of a consultative and advisory body to the participating governments in matters affecting the economic and social development of the territories included within its scope, and the welfare and advancement of their peoples.

At the date on which the Agreement was concluded the territorial scope of the Commission included those islands lying generally south of the equator from Netherlands New Guinea in the west, to French Oceania and Pitcairn in the east. The Trust Territory of the Pacific Islands under United States administration and Guam were added to the Commission's area following the signing of an agreement to this effect at Commission headquarters, Noumea, on 7th November, 1951.

The Commission itself consists of twelve Commissioners, two nominated by each participating government, who direct the activities of a full-time staff with headquarters in Noumea, New Caledonia. Its first session was held in Sydney in May 1948 and two sessions were held each year thereafter until October 1953. The Agreement was amended in April 1954 to provide for one regular session each year and for such further sessions as might be considered necessary. This year, in addition to the regular October session, the Commission met in Suva following the conclusion of the Third South Pacific Conference on 3rd May.

The Commissioners together comprise a body of men long-versed in the practical side of Pacific affairs and problems. Combined with this experience is a knowledge of, and sympathy with, the islanders' aspirations, acquired not only by day-to-day contact, but by a close and devoted study of questions such as those which engage their energies at Commission sessions. The accumulated wisdom thus brought to bear on subjects as diverse as culture contact, co-operatives, nutrition, island crops and industries, and the organization of the Commission's secretariat, is vast. Its application has resulted in decisions characterised by the discernment revealed in the diagnosis of each problem considered and, if the medical analogy may be pursued, the accuracy rather than the palatability of the prescription.

The "advisory and consultative" functions of the Commission and its two auxiliary bodies, the Research Council and the South Pacific Conference, have sometimes evoked the criticism that the Commission's advice has been distinguished both for its practical relation to regional needs and for the fact that it is not always taken.

However trenchant such criticism may sound, the participating Governments have always given the fullest consideration to advice tendered by the Commission on questions of regional importance.

Mr. W. V. D. Pieris, the Commission's coconut expert from 1952 to 1954, examining a coconut nursery on Ant Atoll in the Caroline Group. A regional study on copra manufacture by Mr. Pieris has been published by the Commission in its Technical Paper series (No. 82).

On numerous occasions they have supported further investigation into them, or initiated action in co-operation with the Commission and other interested governments towards their solution.

It should be borne in mind that each of the Commission's participating Governments is itself providing increasing aid directly to its territories; the function of the Commission has emerged as one of adding to these efforts by doing what partnership can do.

Advice On Common Problems

Thus the Commission provides the island peoples with highly-qualified advice on copra, cocoa and rice production; fisheries; human, plant and animal quarantine; certain diseases; diet and nutrition; and on methods of making good reading material available. It undertakes or assists research into common problems such as those associated with population increase or decrease, mosquito-borne diseases, subsistence agriculture; maternal and child welfare; the establishment and management of co-operative societies, and industrial development.

Its information services place at the disposal of workers among the island peoples not only news of the Commission's effort, but knowledge from any available source that may be of service to them.

The Commission's budget is limited, amounting to some £stg.200,000 per annum. Of this amount, Australia contributes 30% and the other Governments 15% or 12½% each. The range of desirable activities in relation to funds and staff available is almost infinite. It was in this context that Commissioners at their October 1953 session decided, as it were, to apply one of the principles of war to the ends of peace, and to concentrate the resources at their disposal on outstanding needs and opportunities in the Pacific region rather than to diffuse them over an extended field.

Commissioners agreed that the work programme should be designed as a whole to further with the utmost effectiveness the economic and social welfare and advancement of the people in the region. Projects included in the programme were to show promise of making, in support of the efforts of the territorial authorities, a fairly rapid, effective contribution to one or more of the following objectives: increased production of goods and services by the inhabitants of the region; increased efficiency of the inhabitants in their life and work; increased participation by the

During the fisheries conference held by the Commission at its headquarters in Noumea in May, 1952, delegates were taken on a reef-fishing expedition to watch a demonstration of native fishing methods. Here a New Caledonian native is shown holding a speared carangue, or trevally. It is the task of the Commission's fisheries officer to encourage the use of more modern fishing techniques throughout the region.

inhabitants in the life and development of their communities.

Projects were to be especially concerned with needs for regional action in matters where action was either beyond the capacity of administrations or could be more effectively or economically undertaken by the Commission.

Having established the above criteria the Commission decided that for the next five years its programme should be concentrated on such subjects as health education, nutrition, mosquito-borne diseases, subsistence economies, coconut industry, rice industry, fisheries, pests and diseases (especially the rhinoceros beetle), literature promotion, audio-visual aids, community development, co-operatives, and population studies.

Two Auxiliary Bodies

There are two auxiliary bodies advisory to the Commission, the Research Council and the South Pacific Conference. The principal function of the Research Council is to advise the Commission on what investigations are necessary and to indicate the relative urgency of such investigations. The first meeting of the Council was held in Noumea in May 1949. It normally convenes in May or June of each year and its meetings continue for a period of two or three weeks.

Members of the Council are appointed by the Commission. They are selected as persons distinguished in those fields of research with which the Commission is particularly concerned — health, economic development and social development—and also for their special knowledge of territorial problems in one or another of these three fields.

The latter criterion of selection has resulted in the majority of councillors being appointed from among officers of territorial government services. It should, however, be emphasized that councillors do not attend meetings in the capacity of advocates for their respective territories. Their work consists in examining research needs from the point of view of the regional significance of such needs and recommending projects designed to meet them.

The Commission's current programme is also reviewed at Council meetings and recommendations are made where necessary for the adjustment of its content to take account of new factors which have come into operation since the programme's establishment. Observers from certain of the United Nations' specialised agencies and other institutions interested in the Pacific have been accredited to previous Council meetings. The Council can, if it desires, recommend the attendance at its meetings of consultants on particular aspects of research.

This procedure has resulted in the Council's being able, on the one hand, to take account of the activities, interests and facilities of the United Nations' specialised agencies, foundations, universities, and research organizations in framing its recommendations to the Commission, and on the other, to avail itself of highly-specialised consultant services when required.

Collaboration By Specialized Agencies

The specialized agencies and other institutions represented at Council meetings are afforded the opportunity to participate in the preparation of plans for future action in the area. They can, in consequence, often arrange for the disposition of the technical and financial resources available to them for employment in the Pacific area so as to supplement the Commission's efforts in a particular field or to assist it by other work in cognate fields.

An example of such collaboration is the Fisheries Training Course for students from Pacific territories which the Food and Agriculture Organisation of the United Nations and the Commission jointly propose sponsoring in Noumea in November of this year. The course is to be directed by the Commission's Fisheries Officer, Mr. H. van Pel, and an assistant director to be

Health education among island peoples is being encouraged by the Commission in a variety of ways, one being the production of posters such as that shown here, prepared for a campaign against alcoholism in New Caledonia.

appointed by F.A.O. Dr. F. Bugnicourt, Director of the French Institute of Oceania, has undertaken to assist the course by making the services of members of his oceanographic research staff available to give lectures on certain subjects to students attending.

Grants By Foundations

Other assistance afforded the Commission has taken the form of financial grants by foundations.

In 1955 the Rockefeller Foundation granted an amount of $47,000 towards the Commission's campaign against the coconut rhinoceros beetle. This grant enabled the existing research programme to be expanded to include a three-year study of the diseases affecting the beetle. An insect pathologist, Dr. Paul Surany, formerly of the Illinois State Natural History Survey, was appointed to the Commission staff to undertake the work, most of which will be performed in Ceylon, India and other South-East Asian countries.

At the time the Rockefeller grant was made the Commission already had two entomologists, Dr. R. Cumber and Mr. T. V. Venkatraman, working on the coconut rhinoceros beetle problem in Western Samoa and India, respectively. Their investigations are now directed by Dr. C. P. Hoyt, who succeeded Mr. L. J. Dumbleton, formerly the Commission's Plant and Animal Quarantine Officer.

Dr. Cumber's work involved the study of beetle ecology, the testing of chemical attractants and the introduction, if required, of parasites, predators or diseases from India. Mr. Venkatraman's contribution to the investigations consists of searching for controlling agents such as parasites in South East Asia, India, and possibly East Africa.

The Rockefeller grant has enabled the attack on the beetle to be converted into a two-pronged one.

Another grant amounting to $8,000 has been made by the Williams Waterman Fund of the Research Corporation of New York, in aid of the work on the chemical analysis of island foods being performed in Noumea by the Commission's biochemist, Mr. F. E. Peters.

The South Pacific Conference

The other body auxiliary to the Commission, the South Pacific Conference, provides a means of associating representatives of the island peoples with the Commission work. It may discuss matters within the Commission's competence and make recommendations concerning them to the Commission. The Conference held its first session in Suva in 1950, its second in Noumea in 1953 and its third in Suva from 23rd April to 3rd May last. Delegates to the Conference from certain territories are nominated by their own legislatures, while others are appointed by their administrative authorities. The Conference in operation has demonstrated its responsibility and the Commission and its participating Governments have given full effect to recommendations made by the Conference in many phases of the work programme.

Fijian women engaged in craft work at Nasesara, on Moturiki Island, locale of a pilot project in community development carried out under Commission sponsorship. The report of Mr. Howard Hayden, who directed the project, has been published by Oxford University Press for the Commission in a special series.

During the comparatively short period of its existence the Commission has instigated a number of projects designed to assist economic and social progress in the region.

While the compass of this article is too narrow to permit a comprehensive review of the development of the whole of the work programme since its beginning, an examination of a few of its aspects will reveal the nature and extent of the contribution the Commission can make to regional welfare.

Work On Mosquito-Borne Diseases

As the result of a proposal made at the First South Pacific Conference in 1950, a conference of experts on filariasis was convened in Papeete in August 1951. This meeting was unique in several respects; it was the first international conference on filariasis, the first scientific conference organized in Tahiti and the first medical conference sponsored by the Commission.

The holding of the conference opened a new chapter in the Commission's history. It led to the collaboration between the Commission and outside institutions in this particular field, and subsequently in others, which has since proved so fruitful.

Under the direction of Dr. E. Massal, the Commission's Executive Officer for Health, the long-term programme which followed the determination by the conference of the problems resulting from filariasis and elephantiasis, was first implemented by Dr. J. Kerrest, now Director of the Medical Research Institute in Tahiti, and later, by Dr. M. O. T. Iyengar, the Commission's research specialist in mosquito-borne diseases.

Since Dr. Iyengar's arrival in Noumea some two and a half years ago it has been possible to settle in consultation with the territorial authorities, certain questions relating to the organization and conduct of campaigns for the control of filariasis. Advice given by Dr. Iyengar in Tahiti and in Western Samoa has stimulated the adoption of effective mosquito control measures in both territories. The local inhabitants are enthusiastic about these control measures and are anxious to co-operate with the administrations concerned in adopting them. In these circumstances, the success of both schemes seems to be assured. Film strips and leaflets showing simple sanitation practices have been prepared, and will assist the villagers to understand how the diseases may be controlled.

The value of the recommendations for long-term activity made by the filariasis conference and the Commission's work in connection with them, has been recognized by outside institutions and agencies. A study group of experts on filariasis from all parts of the world met recently in Kuala Lumpur under the auspices of the World Health Organization. Dr. Iyengar, who was invited to attend this meeting, was unable to do so and nominated Dr. E. Massal to attend in his stead. The discussions at the meeting covered the entire field of control of and research into filariasis. In the course of its deliberations the group expressed the desire for closer co-operation between the World Health Organization and the Commission. It sought to define fields in which joint action would result in practical benefits, and in this connection a proposal made by the Commission is now being examined by the Section of Endo-epidemic Diseases at World Health Organization's headquarters in Geneva.

As Dr. Iyengar's investigations have proceeded, the results have been published in the Commission's Technical Papers series. The following Papers have been issued to date:

Annotated bibliography of filariasis, Part I, Epidemiology of filariasis in the South Pacific Region; Part II, Studies on mosquitoes of the South Pacific region;

Distribution of filariasis in the South Pacific Region.

Distribution of Mosquitoes in the South Pacific Region.

The comprehensive synopses of previous research into different aspects of filariasis are valuable, in that information not hitherto easily accessible is presented in consistent form in the one series of documents.

Subsistence And Cash Crops

Subsistence agriculture is another important sphere of Commission activity. Mr. Jacques Barrau, the Commission's Technical Officer (Subsistence Agriculture) has made an extensive study of traditional agricultural methods practised in Melanesia and Polynesia. This study of existing methods has led to the suggestion of ways in which they might be improved through the introduction of higher-yielding strains of plants, manuring, more efficient tools and better cultivation methods. During his visits to territories Mr. Barrau has obtained food samples for analysis in the Commission's bio-chemical laboratory, and has also studied traditional methods of processing and preserving food. These latter activities are complementary to those aspects of the Commission's nutrition programme related to the nutritive value of island foods and to food technology.

Mr. R. Watson (left), a rice expert, discussing wet land rice cultivation at St. Louis Mission, near Noumea, with Dr. Alex Kroon, who is in charge of the Commission's economic development programme. Mr. Watson's services were made available to the Commission by the Food and Agriculture Organization to undertake a survey of the rice-growing possibilities of selected Pacific islands. The Commission works in close co-operation with the specialized agencies such as FAO, WHO, and UNESCO.

Reference has already been made to the investigations into the control of the coconut beetle. The coconut and the products derived from it play a vital role in the subsistence of most Pacific island peoples. The income derived from the export of coconut products represents about 40% of the total value of commodities entering into the region's export trade.

In order to provide specialist advice on the coconut industry and to improve cultivation methods in the area, the Commission engaged the services of Mr. W. V. D. Pieris for a period of two years. During his visits to the territories Mr. Pieris gave practical advice to growers on coconut cultivation and selection. Much of this advice has been included in the booklet, *Wealth from the Coconut*, which has been published in English, French and several vernacular editions under a guarantee given by the Commission's Literature Bureau. A more general report by Mr. Pieris entitled, *The Manufacture of Copra in the Pacific Islands*, has been published by the Commission in the Technical Papers series.

The above examples are typical of the Commission's activities in other sectors of the work programme. The complementary relationship between the investigations into subsistence agriculture and nutrition also exists between other projects such as literacy and literature promotion; health education and audio-visual aids; co-operatives and community development. Continuity in the programme and coherence between its various elements are thus ensured.

However, the task of translating the results of research into practical terms so that they can be applied by the island peoples themselves is no easy one. Such contributions as the Commission has been able to make to regional progress would not have been possible without the counsel and practical assistance of its participating governments and their territorial administrations, interested institutions, and the two bodies auxiliary

(Continued on page 49)

Overhauling fishing nets in a village in the Trobriand Islands, a coral archipelago about one hundred miles east of the New Guinea mainland.

HOW TO TAN Nets, Sails, and Lines

The life of fishing nets, sails and lines can be greatly prolonged by tanning. This article expains a simple way of carrying out this process, using a tanning solution made from the bark of the mangrove tree, found on most islands of the South Pacific.

By H. VAN PEL*

MOST of the fishing nets used in the South Pacific islands are made of vegetable fibres, either produced from local plants or bought in stores, either in the form of ready-made cotton netting or of cotton twine which is knitted into a net.

For the most part these nets are small, although some fair-sized ones are made. Generally they are not tanned, and quite often they are in bad condition. This is of course understandable in places where no materials are available for preserving the yarn, but tanbark from mangrove trees is available in most of the islands, at least in the western half of the Pacific. In the tanning process the fibres are impregnated with tannin, which prevents bacteria from damaging them.

Tanning material being so readily available, I suppose that lack of knowledge is responsible for the fact that most nets are allowed to deteriorate. The need for an article on the subject was impressed upon me when a fisherman, using unprocessed cotton nets, asked me how he could make them last longer, as he had found that they became rotten after five months' use. When I told him to tan them, he said he had heard of the process and would like to order cutch from Europe. All the time, however, his nets were hanging from a mangrove tree (*Rhizophora mucronata* in this case) whose bark could provide good tanning material. Indeed, I satisfactorily tanned a piece of netting with the bark of that very tree.

The tannin content of the bark varies with the different species of mangrove, and also with the locality in which they grow. The best grades of tanbark used in Indonesia for tanning nets and lines contain 28.7% and 29% tannin, coming respectively from *Rhizophora mucronata* and *Ceriops condelleana*. It seems that the first species has a lower tannin content in New Caledonia.

The best bark is taken from branches 3-6″ in diameter. After drying in the sun, it can be kept for a long period.

The Tanning Process

The tanning process itself is simple. First of all, the tanbark is chopped into small pieces (about 3″) and put to soak for 24 hours in fresh water, in the proportion of one volume of bark to three volumes of water.

The second step consists of boiling the bark in the water for one and a half hours, after which the tanning solution is ready. Meanwhile the net, sail or lines to be tanned must be thoroughly rinsed, preferably in fresh water, in order to remove the yarn finishing (or the seizing in the case of sails) from new materials, or the dirt from old.

The items to be tanned must be clean and dry when they are put in the tanning solution, where they should be left for twelve hours before being taken out and dried. They must then be dipped again in the solution for twelve hours.

A net that is used every day for a few hours should be tanned every month. If it is in the water six hours or more a day, then tan it every fortnight.

The tanning solution can be used several times, more water and tanbark being added every time, but it is best to prepare only enough for one's immediate needs. A new net tanned for the first time turns brown. After being tanned several times it becomes dark brown.

If the tannin content of the bark used is low, the proportion of bark to water used in preparing the tanning solution must be increased. A tanning solution can be prepared merely by soaking the bark in cold water for fourteen days. However, in my experience, boiling the bark has proved the best method.

The nets should always be washed thoroughly, preferably in clear fresh water, and dried in the shade before storage. Fish slime and seaweeds clinging to the nets after use are the chief enemies of all natural fibres. These should be removed by washing and the nets stored hanging loosely in a well-ventilated shed. Such precautions can help fishermen to derive the full benefit from the tanning process described above.

With proper care, tanning can triple the life of nets and lines.

* Fisheries Officer, South Pacific Commission.

Pilot Village Sanitation Programme On Guam

Encouraging results from a pilot study in village sanitation improvement, carried out on the island of Guam, are reported in this article.

By LAWRENCE T. COWPER

Chief, Sanitation Unit, Department of Medical Services, Government of Guam.

Right: The village of Talofofo, with a population of about one thousand people, was selected as the experimental area. The objective was to establish a general pattern of sanitation activity for future public health sanitation programmes on the island.

THE Island of Guam offers an interesting field of study in the social, health and economic evolution of a select group of Micronesian peoples. Located in the Upper Marianas Group, it is the home of some 37,000 permanent civilian inhabitants who have been influenced for over the last fifty years by the United States as that nation's most westward possession. Although not a large island, Guam covers some 250 square miles of area, which include high cliffs, mountains, swamps and marshes, and plateau land.

The impact of the military occupation is considerable, although some of the economy is based on agriculture and other home industries. As a result of the military atmosphere and economy, the pattern of living of the people of Guam has altered considerably from that originally followed and still seen in the islands both south and north of Guam.

Historically, the island had been under the control of the Spanish for several hundred years, until the end of the Spanish American War. From that time until 1950, with the exception of the World War II period when the island was held by the Japanese, Guam was used almost exclusively as a United States naval base and was so governed. In 1950 Guam became an unincorporated territory and came under civil administration. A unicameral legislature which meets twice a year is made up of 21 Guamanian men and women who are elected from the general population. The Governor is a civilian directly appointed by the President of the United States.

There are approximately 19 villages on the island with an average population of 1,900, to upwards of 4,500 people in the larger villages. The people by race are classed as Micronesian, but the influence of the Philippines and Malay racial groups is quite noticeable. The villages differ individually, but there is a general social, economic and cultural pattern in those which lie in close proximity.

In the central and western districts, the villages noticeably indicate the influence of the navy installations and influence, and it is in these areas that the main business and entertainment centres are located. The wage earners in the families of this area in almost all cases work for the Federal United States Government or territorial Guam civilian Government, or operate small individual businesses such as grocery stores, restaurants, curio shops and general stores. The outward appearance and manner of operating these establishments is quite American in appearance—not unlike business areas in small mid-western or western towns in the United States.

The villages in the southern and eastern districts, on the other hand, are primarily agricultural, and show much less effect of the proximity of the navy or civilian government.

Public Health Background

It is in this rural and agricultural area that the chief public health problems lie. What are these problems? In a recent school survey it was learned that 50% of the children of the southern and rural area are affected with parasitic worms. The gastroenteritis index in this southern area runs from 980 per 100,000 to 1,420 per 100,000. Although it is considered that nutrition is a definite factor in the incidence of gastroenteritis, it is also felt that sanitary conditions in the village are responsible for a large proportion of the diagnosed cases.

The climate and general environmental conditions found on Guam, as in most areas of the Western and South Pacific, are ideal for the favourable production of almost all the sanitarily important pests—the rat, the mosquito, and the fly. The extensive unoccupied areas of land provide ample space for the continuance of wild reservoirs of mosquitoes, rodents, and other pests of both sanitary and of agricultural importance.

The specific insect vectors for a number of diseases are present on Guam, including malaria, filariasis, dengue fever, and encephalitis. Fortunately, malaria is not known on Guam, and with the exceptions of two severe outbreaks in the late 1940's, dengue and encephalitis are not being observed clinically. Filariasis is also not reported on Guam, although islands to both the south and north do report cases of filariasis. Plans are being made by the Guam Department of Health for further study of this problem on the island.

It is quite easy to see that basic health education of the peoples who live in these southern villages is of utmost importance if any sanitation programme is to be successful over a long period of time. It becomes the primary responsibility of the Sanitation Unit from both an economic and social point of view to "help people help themselves" in the establishment of a better home environment by careful and well-planned community health education for a better way of life. A day's wage loss from the job, or a day's labour lost in the field, which may result from preventable illness, is a definite economic factor on Guam, due to higher cost of living than is observed elsewhere in this part of the Pacific.

The Project in Talofofo

In order to determine whether commonly-accepted American public

Left: Container of warfarin concentrate. Right: Weighing warfarin. Poison rodent baits used on Guam are based on a rolled oats—warfarin mixture. A fungicide is added to prevent mould, and coconut oil for bait acceptability.

health education techniques, with local variations, would be of use in this rural area, a typical village in the southern end of Guam was selected for pilot study in an effort to establish a general pattern of sanitation activity for future public health sanitation programmes. The village of Talofofo, with a population of about 1,000 native Guamanian people, was selected as the experimental area with the consent of the village commissioner. (The village commissioner is elected for a term of four years by the people of the particular village and is their representative in all official and quasi-official matters pertaining to the village, including, of course, sanitation. There is no town council or board of representatives as is common in the United States, or village council or chief as is common in other islands in the South or Western Pacific. Talofofo was selected partially because the commissioner had been in office for a number of years and was well thought of by the people of the village, and partially because of a relatively high gastroenteritis rate.)

Using the school survey and hospital records and other local information as text, and pointing out the high worm infestation and gastroenteritis rates, we were able, at a preliminary meeting, to convince the commissioner of the need for improvement, and to secure his support for the projected sanitation and health education programme. It was agreed that at the monthly village meeting, and with his active co-operation, the whole position would be explained, and the support of the village people sought for the projected sanitation and health education programme. In the course of this and other discussions it emerged that rat infestation was a problem of consequence in the minds of the village people, not only in its public health aspects, but also on account of nuisance and economic loss.

At the village meeting, one of the staff sanitarians, speaking in the Chamorro language, presented a full survey of the position of the village in respect of defective sanitation, and its results in high gastroenteritis and worm infestation rates, and also rodent infestation. He outlined the work requiring to be done, and offered the services of a qualified sanitarian from the Department of Public Health to visit individual premises, and to demonstrate and advise on the correction of any sanitary defects found.

Rat traps, free on loan, and "warfarin" baits were also offered to householders, to be given following the inspection of the premises concerned and the remedying of any defects found, especially in relation to rat harbourage.

The village people accepted these offers. A qualified sanitarian was assigned full time to the village of Talofofo for a two-week period and was responsible for the inspections of individual premises and subsequent action. The inspection of premises by the sanitarian was arranged to be made in company with the owner, so that he could have the sanitary defects pointed out to him, and the reasons why they should be corrected explained from the public health point of view.

As rodent control was the central theme of our sanitary survey, the sanitarian fitted the suggestions for proper home sanitation improvement into the pattern of a good rodent control programme — elimination of harbourage, elimination of food supply, rodent proofing, and finally destroying. These recommendations included proper privy construction, proper garbage storage, adequate screening, and good food storage in the home. Such recommendations would lower not only the rodent population, but also drastically affect the fly and mosquito index.

After the sanitary survey had been under way for two or three days, a programme of proper home sanitation was presented in the public school by another of the staff sanitarians. The principal of the school was well informed of the rodent control project and the general sanitation programme in the early planning stages and welcomed the discussion of the events happening in the village in the classroom.

A specially-prepared illustrated flip chart, suitable for Guam, showing some of the main aspects of proper home sanitation, was used. The illustrations showed such items as proper rain-barrel water storage; proper privy construction; elimination of mosquito and rodent breeding areas; and proper refuse storage.

The sanitarian encouraged informal group discussion by the children and allowed ample time for questions from the group. The informal sanitation talks were, of course, made to fit the particular age group concerned, and were given in English as is required by the Department of Education. Particular emphasis was laid on the sanitary survey and improvement work which was presently being carried out in the village with regard to bringing about good rodent control. Many of the children carried to their home, ideas which were given in the field that same day by the field sanitarian to their parents. The school principal tied in essay and public-speaking projects on sanitation following the sanitarian's visit in the school for the next week or ten days. Contact and co-operation with the local Parent-Teacher Association was organized and secured.

The reaction in the field with the property owners was in general one of understanding of our programme due to the good work of the village commissioner, the talk at the village meeting, the work of local interested people, and the informal discussions held at the

Left: A bamboo bait station for the rolled oats—warfarin mix. Right: Setting a snap trap with coconut bait. The wire is used to tie down the trap.

school. In practically all cases the owners knew of the sanitation programme, and many of the home owners had either cleaned up their premises, or had started to do so before the sanitarian came to the property. The majority of the defects which were found at the premises were in relation to rat harbourage or improperly-constructed latrine facilities and some definite direction of the owner's effort was made available by the sanitarian's visit.

In many cases, rodent snap traps or poison bait were requested by the property owners. Special care had to be taken in setting the snap traps, as chickens wander freely in the village and would be injured if caught by a misplaced rodent trap. (Chickens, of course, add to the fly-breeding area, but little work was done during the programme to emphasize proper poultry sanitation.)

The bait used in the traps was cut coconut, which is plentiful in Guam and which has been found through experience to be economical and readily acceptable to the local rats. In some instances, if the cut coconut is burned or charred by a flame, the bait attractiveness is much improved.

Poison rodent baits on Guam as a policy are entirely based on a rolled-oats-warfarin mixture, using one pound of 0.5% warfarin to 19 pounds of rolled oats, as is recommended by the United States Public Health Service for local use. To this mixture is added a fungicide to prevent mould and coconut oil for bait acceptability.

The warfarin bait station consisted of a locally cut bamboo stalk some two or three inches in diameter and eighteen to twenty inches long, with inside stalk sections removed. In some cases, copra mixed with warfarin can be used as a bait. This type of material for mixing with warfarin is not used on Guam normally as it is on other islands where the collection and preparation of copra as a trade is more common.

It is obvious from the preceding general discussion that bait for traps and bait stations is not difficult for home owners to procure. The home owner was informed by the sanitarian during his visits of the procedures of collecting and preparing the baits, of a few techniques in setting the snap traps, and in the use of the bait stations. The village commissioner had the responsibility of issuing and accounting for all traps. No traps were issued by the field sanitarian during the inspection and education work. We did not have the resources of money or man-power to help rodent destruction of agricultural crops, but advice and technical aid were afforded to those people who wished help in the larger farm areas. The work undertaken was solely based on public health need.

Assessment of Results

On the completion of the initial sanitation survey a conference was again held with the village commissioner to describe and assess work already done and to indicate what was still required. The "Bamboo Telegraph" works very well in the small villages, and before long the whole village was informed of what still needed to be done and what the sanitation programme was accomplishing.

A repeat inspection was begun of those premises which had not been rodent free or had rodent harbourage and food supply available. Of the total of 110 premises re-inspected, in only eight cases was there no definite improvement. This result was regarded by us as satisfactory. After the village commissioner had given small citations to the few stragglers who had neglected to comply, all the defaulting premises showed improvement.

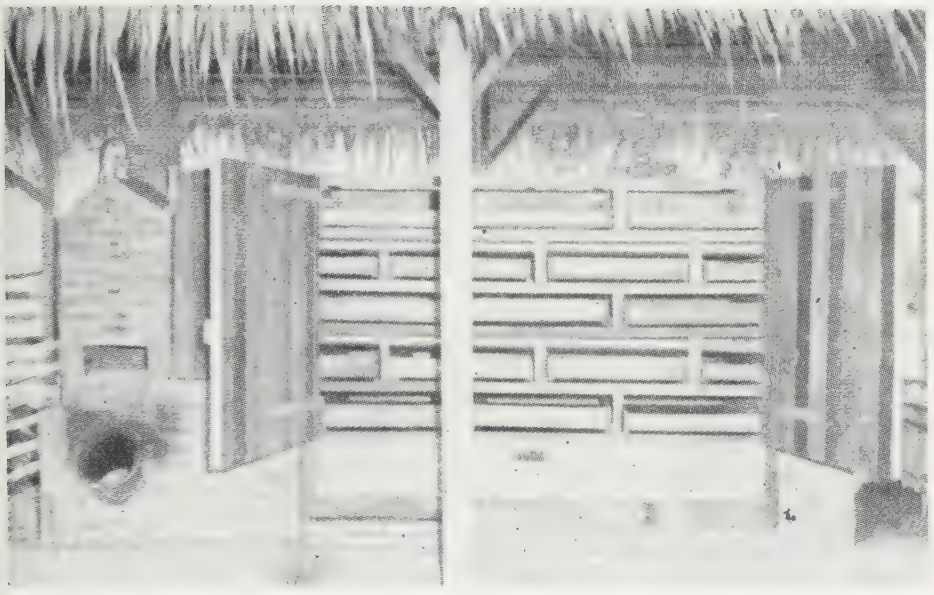
No accurate total of the rodents actually caught or destroyed was possible during the programme, but a rough estimate would be between 900-1,500 rodents in the village alone. Some of the rodents were mice or shrews, but the majority were rats of *Rattus rattus* subspecies.

The most beneficial result of the sanitation programme was the production of a community spirit to meet the sanitation problems in the community. Scores of manpower hours were spent in cleaning harbourage, cutting vegetation, eliminating piles of garbage, providing proper trash and garbage containers and stands, setting traps, and in some instances ratproofing. The improvement was generated by a spirit from "within", rather than from "without" the community. Good public relations were established with the local people so that further sanitary and public health programmes will meet with better acceptance and understanding.

In future sanitation community programmes on Guam, we will slightly vary some of the techniques followed on this occasion, but the same general plan of preliminary adult and school health education will be followed. It is felt after this experience that more time should be spent earlier in the schools. Also perhaps the local religious organization should be included in the initial planning, as the village is strongly influenced by the church and its related activities. This was not done in Talofofo on this occasion, and perhaps would have been helpful. The village meeting in Guam appears to be the closest to what might be termed an adult civic organization, but the lack of such types of local body as are usual in the United States is a notable lack.

In watching the village sanitation picture at Talofofo from an administrative distance for some months, it seems clear that permanent sanitary community improvement has resulted. The hospital records indicate little diagnosed gastro-enteritis in hospital cases coming from this village. The village nurse is observing a reduction in home diarrhoea

(Continued on page 42)



This copra drier, developed by the Silliman University as a research project, is simple in construction and operation, efficient and economical. It is versatile in application in that it will dry not only copra but other agricultural products as well. The Silliman drier operates under the hot-air and draught principles, utilizing the heat generated by burning husks and shells to cause an upward draught in the drying chamber which absorbs and carries away the moisture from the coconut meat.

The Silliman Simple Copra Drier

This article on the Silliman copra drier, originally published in the January 1955 issue of The Silliman Journal, *is reproduced with the kind permission of the author and of the publishers, the Silliman University, Dumaguete, Philippines. Its presentation here follows Commission policy in promoting circulation of technical information on copra driers suited to the region.*

By VICTORIO VERANO

RECENT statistical figures show that the Philippines stands to lose about 81 million pesos yearly as deductions on weight and penalties imposed on the selling price of copra by U.S. buyers. It is a fact that copra produced in the Philippines is so poor that it is considered the worst in the world's market. What a discredit this is to our coconut industry! The consequence of this misfortune is the very low price paid for our copra. The keen awareness that a tremendous economic loss is incurred yearly by this country because of the deplorable quality of our copra has placed the copra dryer on the priority list of engineering research projects at Silliman University.

What are the causes of this poor quality? The causes are the prevalent unscientific methods employed in drying the coconut meat, and the utter lack of interest of the producers in the vital problems that confront the coconut industry such as the improvement of the quality of copra. If the interest of producers to meet their problems courageously could only be kindled, the situation is practically solved, for then they would be willing to employ scientific methods of processing their products.

The present methods of drying copra in the Philippines today are the antiquated sun-drying and tapahan. The copra produced by the former is of very good quality if there is continuous hot sunshine for five consecutive days, but if cloudy days and rain come and disrupt the continuous open-air drying, a very poor kind of copra results—discoloured, mouldy, and partially decomposed. Another difficulty of this method is that it is very slow and depends entirely upon weather conditions over which man has no control.

The tapahan is a system which utilizes the heat generated by burning coconut husks, shells, and wood fuel. The husked and split nuts are piled twenty-four to thirty inches upon floors raised a few feet from the ground. These floors are of narrow bamboo or wooden strips nailed to wooden joists with three-quarter inch spacing between them so that the hot air and smoke from the burning fuel below the floors can go through. The duration of drying by this system is much shorter than the former. Its drawbacks however are: it allows the smoke to come in direct contact with the coconut meat, thus impairing the quality by giving it a very dark color; and it does not uniformly distribute the heat throughout the pile. The copra produced by this method is considered some of the poorest in the world's market.

Two Improved Processes

Have there been attempts to improve the quality of our copra? Undoubtedly there have been some methods introduced, intended to supplant the above systems. These are the desiccated coconut process and the new College Copra Dryer of the College of Agriculture, University of the Philippines, at Los Banos.

The former utilizes the heat of steam generated in a boiler and piped into a system of tubes which serves as a radiator in a drying compartment. In this compartment, in order to maintain uniform heat throughout and to speed up the evaporation of water from the fresh coconut meat, electric fans are installed. These fans also serve to force the exit of the humid air from the compartment. This is perhaps the best type ever introduced in the copra industry, but it requires enormous outlay of capital in its construction and the services of technical and highly skilled men in its operation and maintenance, items which cannot possibly be afforded by the small coconut planters. Probably such process could be put up co-operatively by the small producers, but the Filipinos have to learn yet more about co-operative ways of life before they can go into this system of business operation and succeed creditably.

The latter is a hot-air type utilizing the heat from the burning of fuel (coconut husks and shells). The smoke is confined in the combustion chamber, so that it cannot come in contact with the coconut meat. This method is quick and the quality of copra produced is

classified as very good, comparable to the steam dried. However, there is not a wide acceptance and use of it by the small coconut growers because of its somewhat more complicated operation, which does not suit the working habits of most Filipinos, and because of its higher cost of construction and maintenance than the tapahan dryer. Besides, it lacks compactness.

The objective of our present engineering research project at Silliman University, with a financial grant-in-aid of the James W. Chapman Research Foundation, is to develop a type of dryer that will embody simplicity in its construction and operation, efficiency, economy, and versatility. Local materials should be used whenever they can be utilized so that practicability and economy can be achieved. Mechanical devices that require power to run them such as electric fans and choppers, should be avoided in order to make the operation so simple that unskilled labor can be hired to tend it. Certain devices must be found to make it efficient. Compactness must be achieved somehow to save valuable space and to secure manoeuvrability. This type should be one that will not dry only copra, but also other products of the farmers.

This new process aims to produce copra as good as, or even better than, Ceylon copra and be cheap enough to come within the financial means of the average Filipino planter. We are quite positive that once a dryer of this desired kind is evolved, the improved quality of our copra will not only bring financial benefits and advantages to our planters, but also will improve our position in the world's copra market and safeguard the future of our coconut industry, upon which about one-fifth of our population depends for livelihood.

As a result of this research, the Silliman copra dryer was developed. The writer believes that practically all the qualities desired to be embodied in it are achieved to some degree of success. All the materials are local with the exception of the steel parts. The construction and operation are so simple that an ordinary unskilled laborer was hired with a minimum of instruction and supervision by the writer. It is compact, for the overall size is 14½ feet long, 4½ feet wide, and 6½ feet high. It is versatile, because it has been demonstrated that it can dry anything on the farm. To avoid the use of electric fans as blowers in the drying chamber, a system of ventilation at the bottom and at the top, and a unique arrangement and spacing of the trays in the shelves, was introduced.

This type has been mainly developed to suit the prevalent practice in Negros Oriental area where the nuts are split with an axe and the fresh meat removed from the split nuts with a scooping implement called *loguit* (Visayan). Only the meat goes to the drying compartment and the husk and shell to the furnace as the only fuel. The writer, after a long study of the different methods employed in the Visayas and Mindanao areas, considers this Negros Oriental system very practical and economical. The process which consists of husking the nuts, splitting the shells, drying the meat and shells together, scooping the meat from the shells, and chopping the copra into small pieces, will take much more time and labour than the Oriental Negros system. One advantage of this method is that it makes possible the construction of a very compact dryer.

This dryer, as a pilot plant, is made with a capacity of about seven hundred kilos of fresh coconut meat, or about two thousand nuts. This size is believed to be sufficient for small planters in a sitio, who can agree to take turns in drying their copra. Dryers of larger capacity can be designed and installed according to the quality of production of the place or coconut plantation.

Operating Principle of the Dryer

The Silliman copra dryer operates under the hot-air and draught principles. It utilizes the heat generated by burning husks and shells to cause an upward draught in the drying chamber, which absorbs and carries away the moisture from the coconut meat. The hot gasses and smoke are confined in the fire tubes so that they do not come in contact with the meat. The main reason for adopting this so-called hot-air and draught type is to do away with the costly boilers, steam pipes, and the expensive services of technical men in the operation and maintenance of the plant, thus making the process economical.

Essential Parts

The essential parts of the dryer are the fire box, the combustion chamber, the fire tubes, the drying chamber, the temperature control, the smoke stack, and the trays.

The Fire Box: The fire box is built with locally made bricks which are fire resistant enough for the purpose. An iron grate and an ashpit are provided for proper and efficient burning of the fuel. Scrap iron rods and plates were used for the grate and shutters of the fire box and ashpit doors. An automatic system of stoking the furnace is yet to be devised, which will save many man-hours that could be devoted to other important jobs in the plant.

The Combustion Chamber: The combustion chamber is like that provided in a boiler furnace. It is a room beyond the fire box where the fuel is completely burned and where the incombustible materials carried by the flue are settled. It has two sets of baffles which diffuse the flue, or distribute the hot gasses evenly to the fire tubes.

The Heating System: The heating system is located inside the drying chamber. It consists of fire tubes made of iron sheets ten feet long and arranged in three tiers. The lowest one, which consists of four tubes five inches in diameter, is connected to the combustion chamber. It serves to heat the bottom part of the drying chamber. Each of the other two tiers consists of seven tubes three inches in diameter. They heat the intermediate and upper parts of the drying chamber. Smaller tubes, but more in number, are used in these tiers in order to radiate as much as possible the heat of the flue before it reaches the chimney.

The Drying Chamber: The drying chamber is an enclosed room four and a half feet wide, ten feet long, and six and a half feet high. It is divided into five tiers in which the trays containing the fresh coconut meat are placed for drying. The walls are made of wooden boards, though they may be made of sawali plastered with mud or cement mortar. One entire broad side serves as a door for loading and unloading and it has hinged shutters. The top is completely open in order to allow the free escape of the humid air rising from the chamber.

The Temperature Control: The temperature control consists of a shutter at the inlet-air opening of the fire box and a damper in the chimney. Closing either one or both will regulate the entrance of air into the fire box and the exit of the flue through the chimney.

The Smoke Stack: The chimney is constructed with earthen pipes nine inches in diameter. It rises up through and reaches well above the roof.

The Trays: There are two sizes of trays. The bigger ones are about 27 inches wide, 48 inches long, and 4 inches deep. The smaller ones are half as wide. The frames are made of one inch by four inch boards and reinforced with strips of galvanized iron sheets nailed around the corners. The bottom parts are of wire screen ½ inch mesh and ¼ inch mesh.

Operation of the Dryer

The first thing to do in operating the dryer is to clean the ashpit of ashes and open the damper and the ashpit door. Then place in the fire box kindling materials such as crumpled papers, dry coconut leaves, bamboo sticks, etc., with a few very dry husks and shells. Ignite the kindling materials and close the feed door. About ten minutes later add more dry fuel, eight to ten pieces of husks and shells. Keep the fire burning with full fuel charge until the temperature inside the drying chamber comes to the desired degree.

The next step is to load the trays with fresh coconut meat, spreading it evenly to a thickness of three to four inches.

Stoking the Silliman drier with coconut husks and shells.

Overloading the trays should on no occasion be done because uneven drying will result. Then place the trays inside the drying chamber and close the door.

In order that there will be a draught from the bottom to top of the drying chamber open the inlet-air at the bottom. If the wind is blowing moderately, close the inlet-air on the leeward side and keep the windward open. This will cause a strong draught in the drying chamber.

Determine the temperature of the drying chamber with the use of a thermometer. If the temperature is not yet at the right degree, put more fuel in the furnace, with ashpit door and inlet-air of the fire box fully open. If the temperature is too high, close the ashpit door completely and adjust by partially closing the inlet-air of the fire box and the damper. This will limit the air going to the fire.

When everything is put into proper operating condition the only things to be done are to stoke the furnace regularly, watch carefully the temperature in the drying chamber and regulate the control accordingly. No stirring of the copra is necessary.

After 18 to 20 hours of continuous drying with a uniform temperature inspect the copra thoroughly. At this time the copra is about done. Remove all that are already dried to the desired degree and recharge the trays with fresh ones. If some pieces of copra dry more slowly than the rest, as sometimes is the case when the fresh meat is spread unevenly or too thickly, put them together in separate trays and place them back in the dryer for further drying.

Data on the Construction of the Silliman Copra Dryer

Into the construction of the first model of the Silliman copra dryer went some 300 board feet of lauan lumber, 10 bags of Apo Portland Cement, one cubic meter of beach sand, 1400 pieces of standard sized bricks, 11 pieces of earthen pipes nine inches in diameter and one foot long, 22 metres of wire screen of ½ inch mesh and ¼ inch mesh, five kilos of wire nails ranging from one to two and a half inches long, 7 sheets of G.I. gauge No. 24 and No. 26, 8 pairs of hinges, 3 inches by 3 inches. The aggregate value of all these materials amounted to three hundred and sixty pesos (P360.00). The labour of skilled and unskilled workers was one hundred and forty pesos (P140.00).

Note: With the experience gained from the construction of the first model, less expensive material can be used and a similar design can be employed, and as a consequence a cheaper dryer will result. For example, the brick work on one end can be eliminated entirely and pipes could be used to connect the lower to the upper tubes. Instead of wooden boards for the sides and shutters, sawali plastered with mud or with cement mortar can be utilized. And the construction of the furnace can be made easier and simpler with pre-designed special bricks. The trays can be made of bamboo pieces woven with desired mesh and reinforced with bamboo strips.

Observations on Tests Made With the Silliman Copra Dryer

Only one man is needed to tend this size of dryer, if drying is the only work to be done. His job is to stoke the furnace, remove the ashes from the ashpit, regulate the heat, inspect the coconut meat in the drying chamber every now and then to find out the progress of drying, open or close the draught openings of the drying chamber, load the fresh meat and unload the dried copra. If, however, nuts are brought in, two men will be enough to split and scoop the meat and to tend the dryer during the night.

For economical operation of the dryer, nuts should be brought in if the point of origin is not very far. This will not only make possible having absolutely fresh and clean meat, but also will furnish fuel and give enough work to the personnel. By this manner, the operations from breaking the nuts to the sacking of the copra can be co-ordinated and controlled properly.

In order to obtain the best efficiency for this type of dryer the operation should be continuous day and night, even Sundays and holidays. To operate intermittently is not economical, especially when the personnel is on a salary basis.

The best kind of copra is obtained when the raw meat is very fresh and clean. When the meat is placed in the dryer as soon as it is scooped whitish copra results. When the meat is brought after 8 to 12 hours of delay after scooping the meat, brown copra will be the result, and 24 hours or more delay results in very dark meat. Slimy and mouldy meat will produce copra of the most inferior quality although dried in this dryer. This observation shows that certain bacterial or chemical action takes place on the surface of the raw meat after a few hours of exposure to the air; if the meat is allowed to be moist for a long time, the product of this chemical or bacterial action surely will be of dark colour upon drying. This fact clearly indicates that the quality and colour of the finished copra depend largely on the length of time the raw coconut meat is delayed before placing it in the dryer. No guarantee therefore can be given to owners of coconut meat as to the quality and colour of the resulting copra, unless the management of the dryer breaks the nuts and scoops the meat. In the light of these observations, in order to obtain the best kind of copra, the raw coconut meat must be very fresh. In other words, the meat should be placed in the dryer as soon as it is scooped.

It is also observed that the colour of the finished copra depends to a certain extent on the temperature maintained in the drying operation. Temperature ranging from 45 deg.C. to 50 deg.C. will produce whitish copra. Temperature from 50 deg.C. to 60 deg.C. tends to discolour the copra a bit. Above 60 deg.C., the copra is sure to be dark brown. The foregoing observations were made on really fresh meat.

Cleanliness of the raw coconut meat also plays a part in determining the quality and colour of the copra. Sometimes a considerable amount of mud, sand and trash are mixed with the raw copra. The mud surely discolours the copra and clogs up the meshes of wire screens, thus preventing the passage of hot air into the meat. As a result, the meat might be spoiled badly instead of being dried. Therefore, it is strongly recommended that the raw meat must be absolutely free from dirt and trash before drying.

The duration of drying has a role in determining the quality and color of the copra. Too rapid rate of drying and continued exposure to the high temperature in the drying chamber makes the edges of the copra very brown, the surface brown, and the middle part of the meat still raw. This fact strongly shows that the ideal rate of drying copra should be the same as the rate of the moisture in passing from the inner part to the

(Continued on page 42)

Left: Tiny tots of the Rabaul Pre-School Centre have a morning meal break; they are served with milk, fruit juices and sandwiches. Right: A corner of one of the play rooms. The boys are playing with building blocks, while the little girls are busy around a toy stove.

Pre-School Child Care In Papua and New Guinea

The post-war development in Papua and New Guinea of facilities for pre-school child care, including the establishment of pre-school centres throughout the territory, is described below.

By DOREEN RYAN

Pre-School Officer, Department of Public Health,
Administration of Papua and New Guinea.

WITH the return of civilians to the Territory in the early post-war years, many young families came to settle in Papua, mainly at Port Moresby, the seat of the Administration, and at Samarai. On the New Guinea mainland settlement centred around Lae, Madang, Wau, Bulolo, Wewak, and later, Goroka. In the New Guinea islands, Rabaul and Kavieng were the centres of greatest post-war settlement.

A body of public-spirited women in Port Moresby, realising the pressing need to supply some facilities for group play and companionship for the many pre-school children, while at the same time relieving a little of the burden imposed on young mothers by difficult housing conditions, organized a service whereby children could be gathered together three times weekly at a play centre.

Premises were at first obtained at the Returned Servicemen's League Club rooms at Ela Beach, then later at the Red Cross Hall. A daily roster of interested women then volunteered to care for the group of approximately thirty children for about three hours each morning three times weekly. A small fee was charged for this service. A trained kindergarten teacher was available in 1948 to advise voluntary workers on programme planning and the selection of suitable equipment.

This system of voluntary rosters continued until the services of a trained kindergartener were obtained from late in 1949 until 1951. Trained infant teachers were then in charge of the Play Centre for approximately a year until supervising duties were delegated to experienced but untrained supervisors.

In other centres similar facilities were set up by local kindergarten committees from about 1949 onwards, either in a convenient hall, or, in some cases, in private homes. With the exception of Lae, which in 1952 obtained the services of a fully-trained pre-school teacher, there now were groups of young children numbering from ten to forty, which were being supervised almost entirely by untrained supervisors. The work done by all these supervisors was commendable because of the keen sense of public spirit which promoted the continuance of this service.

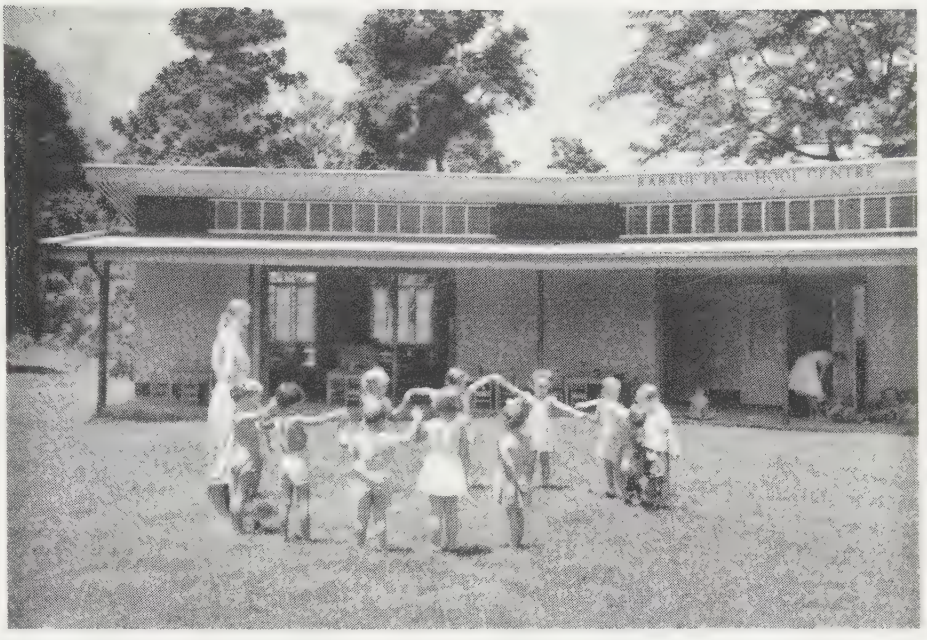
Subsidy From Administration

In order to assist committees towards providing better facilities, the Administration granted subsidies of £150 per annum for each Centre. This subsidy, which was paid through the Department of Education, helped to secure the services of partly-trained supervisors and enabled better equipment to be provided in most Centres, during the period from 1949 to 1954.

While such efforts were being organized by local communities, it became apparent to educators and those interested in the physical and mental development of these young children that trained personnel was a necessity if such a worth-while service were to succeed.

In October-November 1952 the Department of the Interior lent the Administration the services of Miss Jean Adamson, its Pre-School Officer, to report on the means by which the pre-school movement might best be developed in the territory. The Adamson Report was subsequently adopted as a blueprint for future planning of pre-school services in the territory, and many of its recommendations are now being implemented.

Recommendations from the Adamson Report concerning the appointment of a fully-trained pre-school officer and



An exterior view of the recently-completed Rabaul Pre-School Centre, the first of several to be built in the territoy.

trained kindergarten teachers for the bigger Centres were duly considered by the Administration, in order to improve facilities for pre-school child care in the territory.

Survey Of Pre-School Services

It was decided by the Administration to adopt the pattern for pre-school child care set up by the Victorian Government through its Department of Health. Accordingly, on the appointment of the Pre-School Officer in January 1954, it was requested that this officer be assigned to the making of a comprehensive survey of the services offered by the Pre-School Division of the Victorian Department of Health.

This survey was carried out over a period of three months, and on the arrival of the Pre-School Officer in the territory in May 1954 a Pre-School Advisory Board was set up to advise the Administrator on the best methods of applying the principles of a similar scheme for pre-school child care under the Department of Public Health in Papua and New Guinea.

Most of the recommendations made by this Advisory Board were accepted by the Administrator, and the Director of Public Health set up the necessary machinery to implement the pre-school service.

Trained teachers were appointed to the larger Centres at Lae, Rabaul and Port Moresby from the beginning of the school year, 1954, together with a trained relieving teacher. The salaries of these teachers are paid by the Administration. Other Centres continued the service with untrained teachers, closely supervised by the Pre-School Officer, whose duties include visits of inspection and teaching demonstrations at individual Centres. In addition to individual instructions, an organized course of instruction was planned for, at a Summer School conducted at Lae for one week in September 1954. Here the trained teachers lectured and demonstrated to the untrained teachers on all aspects of pre-school education.

Subsidies for Centres where untrained staff are employed are continued by the Administration to further assist Centres in maintaining the high standard of service that is aimed at by the Department of Public Health, through its Pre-School Officer.

The present attendance subsidy paid is £150 per annum, with an additional £10 per child per annum where the average attendance exceeds fifteen. This subsidy is now being paid to five Centres where untrained staff are employed, at Goroka, Samarai, Bulolo, Wau and Wewak.

Until trained staff is available for these Centres, this subsidy will continue, provided each Centre meets the necessary requirements of an approved pre-school service to the community which that Centre serves.

Building Subsidies Granted

Building subsidies, at first on a £1 for £1 basis and later increased to 30/- to £1, were granted by the Administration, to assist committees wishing to build approved pre-school centres. To date, designs for modern Centres have been approved for Port Moresby and Rabaul, and building was begun in both places in January 1955. Each of these Centres is estimated to cost approximately five thousand pounds. It will be fully equipped by funds raised by community efforts.

Other centres which are endeavouring to build new pre-school buildings within the next year are Samarai, Goroka, and the Matupi Farm district, a suburb of Rabaul. Assistance and advice regarding the planning of suitable buildings for these communities is given by the Pre-School Officer in consultation with the various committees, when inspection visits are made by this officer during the year.

In addition to improvement of standards for building and equipment, the parents are drawn into a guidance programme. Through contact with trained staff they are helped to understand and watch more closely, the mental and physical growth of their children. They are encouraged to plan, in the home, practical ways of promoting this development of their children along the right lines. As the child spends only a few hours of his day in the pre-school centre, it is of mutual advantage if parent and teacher can share their knowledge of child nurture and guidance.

This sharing of knowledge and exchange of ideas is being developed through parents' meetings, discussion groups, home visits, films, bulletin boards, and the distribution of suitable literature on child care. Future plans for an extension of this service to parents and untrained teachers include a lending library, radio talks, and a quarterly publication *The Pre-School Bulletin*, which will aim at keeping all Centres in close touch with headquarters and with each other.

"Mailbox" Pre-School Service

Plans to include parents and children on isolated out-stations in a pre-school service are in hand, and through a "mailbox" scheme, books and equipment suitable to the child's age group will be sent out regularly from the Pre-School Office, along the lines of a lending library. Parents will be encouraged to study any problems of development and behaviour and will receive relevant literature and suggestions on how to cope with each problem revealed. Children visiting a large centre from these out-stations are always welcome at the Pre-School Centre, to have opportunities of mixing with other young children.

At Wau and Wewak, Asian children of pre-school age have been enrolled at the local Centre. Children of mixed blood are enrolled at Goroka and Samarai.

In Rabaul an independent move has been made by the Asian community, and a Pre-School Committee for the Matupi Farm District, a suburb of Rabaul, has been formed. Plans to commence building a Centre there in the near future

have now been discussed. Madang has also a considerable Asian community whose representatives have expressed a wish to establish a Centre as soon as sufficient finances are available.

Plans are in hand to assist missions to introduce pre-school facilities through their own native teachers. Lectures and demonstrations have been given to the London Missionary Society teachers at Hanuabada once weekly, while the Papuan teachers training at the Kwato Mission in the Milne Bay District have received two series of lectures on teaching techniques.

Training Schemes For Pre-School Teachers

Reports and observations made indicate a pleasing response in the lower primary grades from native children taught, and it is confidently felt that, because of language difficulties, the instructions now given to native teachers will prove of most benefit at this early stage of pre-school development among native peoples.

To encourage future training, each year two territory girls of Leaving Certificate standard will be offered scholarships for three years training at an approved kindergarten training college in Australia, on the condition that they return to teach for at least two years in this territory.

A training scheme for mothercraft and for infant and pre-school child care has been planned for native girls. This will follow a special course on these subjects to be incorporated in the curriculum in central schools for native girls. In this way, it is hoped to educate native girls to be better wives and mothers as well as providing teachers, and infant welfare and pre-school assistants. As the standard of education is raised among the older native girls, it can be anticipated that some may qualify for a teacher-training scholarship in future years.

Each local Pre-School Centre Committee has representation on the Pre-School Association for the Territory of Papua and New Guinea, which is affiliated with the Australian Pre-School Association. Annual meetings of the Territory Association are arranged in different centres, where all matters pertaining to development of pre-school services in the territory are considered. Recommendations are then made to the Director of Public Health and the Administrator on matters requiring attention. Despite the widely-scattered centres, a healthy liaison is maintained between the community and Administration.

Delegates from the territory attended the Seventh Biennial Conference of the Australian Pre-School Association in Melbourne in August 1955, which was addressed by world authorities on pre-school matters. Miss Christine Heinig, Ph.B., M.A. (Col.), a world authority on pre-school education, who attended this conference, visited the territory during September 1955 and inspected its pre-school services.

Pilot Sanitation Programme On Guam

(Continued from page 36)

cases in the younger age group. It appears obvious that some definite public health accomplishments have resulted, and that the people of Talofofo are enjoying the benefits of a more healthful environment within their community.

There is a great deal more work to be done in the village from a public health point of view, but a foothold has been gained on both public relations and for the sanitation programme. The "team approach", whereby the nurse, the sanitarian, the laboratory, with health education, and vital statistics were all made use of to build village confidence in its own ability and in providing better public health services, produced good results.

The work in the various other villages on the southern end of the island will necessarily be slow, but armed with the Talofofo village experience the public health job will be that much easier and more productive in these other areas. Public health in the Pacific area, as elsewhere in the world, requires a combination of experience, technical knowledge, public health teamwork, and an ability to know and understand the "other man". It is our desire on Guam to blend these characteristics together to provide a more healthful, productive and happy life for the people of the island.

Silliman Simple Copra Drier

(Continued from page 39)

evaporating surface of the meat. Faster than this rate tends to "rare-steak" the copra, which means to say, the surface will appear already done, but the interior part still raw. Slower than this seems to indicate that better quality of copra is produced—less moisture content and almost no discoloration on the surface. The only possible objection to making the drying very slow is that it may prove to be uneconomical at the end. Copra that is dried in 10 hours is very brown, in 14 hours brown, in 18 hours fair, and in 20 to 24 hours or longer whitish. Occasions may arise, however, in which the tempo of operation must be stepped up for some unavoidable circumstances. In such cases, assurance of good quality copra cannot be made.

The matureness of the nuts also has something to do with the quality of copra. Semi-ripe nuts, those that are still green on the tree, yield the most objectionable copra for it has very little oil and results in a most horrible commodity. Their meat is hard to scoop and bothersome to dry. They should not be gathered at all for copra purposes. Mature or ripe nuts, those that are allowed to brown on the tree before harvest, have meat that is easy to scoop and to dry. The copra from them is the best. It has the highest oil content. Over-mature or sprouted nuts have meat partially used up by the young plant. At very advanced stages, these nuts produce the poorest copra.

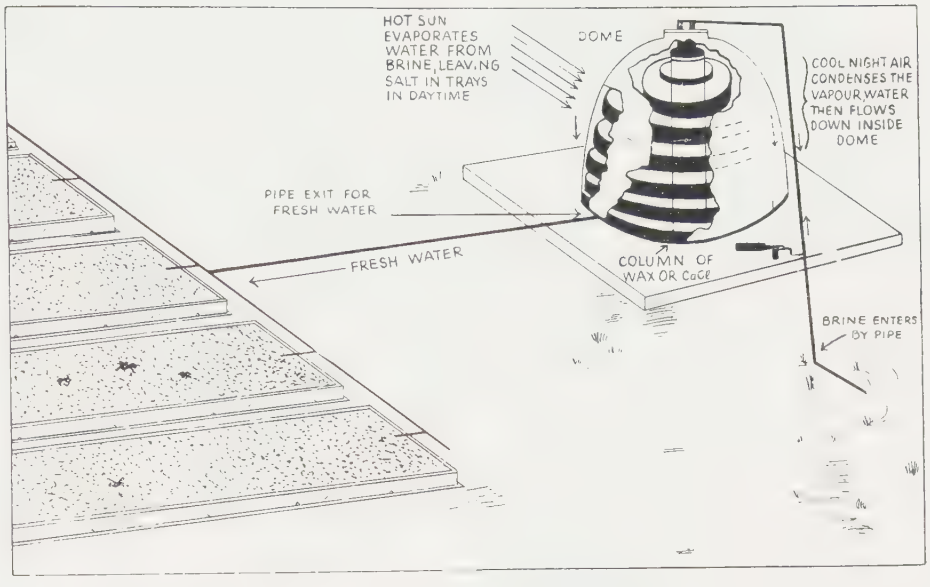
We should not lose sight of the fact that some of the determining factors in producing good quality copra are the skill, the ever-watchfulness, and the sense of responsibility of the tender. If he becomes careless and irresponsible poor quality results. The copra may be half done, over done, scorched. If he is very attentive to his job and performs skilfully and timely what is to be done, good quality copra is the inevitable product.

The moisture content of the copra ranges from 8 per cent. to 10 per cent. The longer the duration of drying the less the moisture content will be. The copra dried in 19 to 20 hours had 10 per cent. and in more than 24 hours 8 per cent. It is possible to reach as low as 6 per cent., but the drying will be too prolonged and uneconomical. However, if the copra is to be stored for some time, say two weeks or longer in a well ventilated bodega, it will reach 6 per cent or even lower, if the relative humidity of the air is low.

It will be of interest to mention here that other farm crops such as rice, corn, beans, etc., have been dried by the copra dryer. Results were very satisfactory. Even some meat and fish were brought in for drying and they were dried as if they were exposed to strong sunshine. For this reason the dryer might equally well be called Silliman General Dryer.

The fuel used was entirely of coconut husks and shells. The consumption depended on its dryness. The drier the fuel the less will be the consumption. The amount of fuel needed to dry a full-capacity loading was about 45 per cent. to 50 per cent. of the husks and shells of the nuts from which the copra was scooped. Only fairly well dried fuel was used in the test. This shows a remainder of about 50 per cent. can be sold for fuel or used for some other purposes.

The above observations were based on the eight trials so far made with the Silliman Copra Dryer, performed under unusual conditions. The weather when these tests were made was rainy and stormy. So the writer believes that the data was not sufficient and typical from which to draw exact conclusions. Many more tests under more varying conditions must be undertaken in order that we can form more intelligent generalizations about the problems of copra drying.


HOT SUN EVAPORATES WATER FROM BRINE, LEAVING SALT IN TRAYS IN DAYTIME
DOME
COOL NIGHT AIR CONDENSES THE VAPOUR. WATER THEN FLOWS DOWN INSIDE DOME
PIPE EXIT FOR FRESH WATER
FRESH WATER
COLUMN OF WAX OR COKE
BRINE ENTERS BY PIPE

Automatic apparatus for distilling fresh water from brine for hydroponic cultivation.

The science of hydroponics, or the growing of crops without soil, has in recent years been greatly simplified in its practical applications. According to the author of this article, it is now possible for anyone to operate the new system of soil-less cultivation which has been developed in Bengal.

Crops Without Soil

By J. W. E. H. SHOLTO DOUGLAS

THE basis upon which a healthy national economy must ultimately rest is an adequate supply of foodstuffs. This is specially true of the British Colonial territories, where increased food production is an urgent need. Many problems, however, face the agriculturalist in these lands. The soil is often infertile, erosion by wind and water is a great problem, crop yields may be poor, and there may well be shortage of suitable farms—or land hunger. There is also the question of expense; often it is not economic to farm a region, even though the food that could be grown there may be badly needed.

The introduction of hydroponics, or the growing of crops without using soil, would enable large amounts of foodstuffs or cash crops to be produced in the areas where they are required, independently of local obstacles. Hydroponics is a Greek word, meaning 'water-working' —an allusion to the fact that plants grown soil-lessly draw their nourishment from solutions instead of from the earth. Hydroponics has made considerable progress during recent years, and it has proved successful in many different regions, under very diverse climatic conditions.

At one time, hydroponics was a very complicated and expensive business. The average grower regarded soil-less cultivation as too difficult for practical use, requiring great skill and elaborate apparatus. The introduction of new and simplified methods has, however, removed these obstacles, and it is now possible for anyone to operate the new system of soil-less cultivation originated in Bengal. Ordinary peasant cultivators and urban dwellers in India are, in fact, using these methods without any trouble.

The success of hydroponics in India as a popular method of crop production could quite easily be repeated in the British Colonies. In congested areas, in places where conventional soil agriculture is impracticable, or in regions of infertile land, soil-less growth of plants would be of inestimable value as a cheap and simple means of raising extra commercial and household crops.

Research studies in the soil-less cultivation of plants were begun in 1946 at the Government of West Bengal's experimental farm at Kalimpong in the Darjeeling district of India. The object was to evolve a novel system, of which practicability and simplicity would be the keynotes, suitable for use by the layman. If success could be achieved in the initial trials, it was hoped that eventually hydroponics would be able to make all the big cities and urban areas self-supporting in all vegetables, so leaving the available fertile country farmlands free to concentrate on cereal growing. At a later stage it might be possible to cultivate the deserts, too. India's food problem would be solved. As the population of the Republic is increasing by another five million persons every year, and will total five hundred million in 1920, the outlook is serious.

In introducing hydroponics a number of problems had to be faced. The drawbacks to adoption of the current British and American techniques were their complications, and the expensive apparatus needed. In addition, due consideration had to be paid to the oriental monsoons, which would upset the controlled exactitude of some methods. Techniques with impressive records of achievement in the United States were known to have failed when tried under damp European conditions.

Careful appraisal of salient problems resulted in the development of the Bengal system of hydroponics, which represents an effort to meet the requirements of the practical grower. Suitably modified and adapted for different areas, it has proved highly successful for several years. There are to-day thousands of hydroponicums operating throughout India, producing large quantities of foodstuffs without soil. Information bureaux and demonstration centres have been set up to popularise the methods. The public has shown immense interest, and the numerous letters that reach the office in Bombay every month from all over the world, including places as far apart as South Africa and New Zealand, Australia and British Guiana, the United Kingdom and East Africa, Ireland and the West Indies, testify to the enthusiasm of all types of growers, both amateur and commercial. Nor have illiterate cultivators been neglected, and many of them are working hydroponicums after short practical demonstrations.

The Bengal system is inexpensive to install, simple to maintain, and economical to operate. Equipment has been reduced to a minimum and full use is made of indigenous materials. Other advantages include higher crop yields, relative freedom from soil diseases and quicker growth, reduction in growing areas by at least one-third, very consistent crops at less cost and no hard

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manual work. Methods are standard, and weeds are practically non-existent. There is better control of plants, with excellent quality of produce, good drainage and no waterlogging, without dirt and smells. All risk of contracting disease transmitted through animal or other excreta used in manuring soil fields is eliminated. Labour needs are much lower, and operation can be made automatic.

Flavour and taste of soil-less grown fruits are first-class. Analyses of carbohydrate, protein, and inorganic constituents of food crops grown in hydroponicums and of vitamin C content have been carried out, and it can be said that there are no significant nutritional differences between the fruits from plants grown without soil and those grown in soil. American experiments have demonstrated that wheat produced from soil-less cultures is better for bread making, while it is possible for tomatoes of high calcium content for feeding to babies to be produced at will in hydroponic beds.

Hydroponics means production of crops without using any organic matter in the process of providing nourishment for the plants. In the simplified Bengal system the crops are grown in troughs or beds, about a yard wide, and of any convenient length. A hydroponicum may be installed in any area, provided light and water are available. The most unpromising site, where any form of conventional agriculture would be unthinkable, can often be made to yield abundantly, by hydroponic techniques. Water is much better conserved in hydroponic beds than by dissipating it wastefully over the surface of the fields in ordinary irrigation.

The hydroponic trough may be made from almost any material. If galvanized iron is used, it must first be painted. Wood, concrete, stones, asbestos sheets, or rock slabs are all satisfactory. For the average farmer, alkali puddled clay, or the very simple and economical non-erodible mud plaster developed in the Punjab by the Department of Irrigation Research, are excellent. The sides of the bed should be about eight inches in height; drainage is provided by semi-porous walls or small holes around the bases, with a gutter to carry off seepage.

The beds are filled to a depth of eight inches with a coarse inert aggregate, preferably a mixture of five parts of stone chips, gravel, or broken stones of five-eighths to one-quarter inch grade, and two parts of sand or rock dust. This is the growing medium, which retains moisture and nutrients, and anchors the plant's roots in position. Water is introduced to this aggregate by a system of inlet pipes, or cans. The growing medium is not flooded, nor allowed to get too dry, but is kept constantly at an ideal degree of saturation. It resembles a damp sponge just lightly wrung out. This is the secret of the whole technique,

since water-logging will kill the crop by cutting off the oxygen supply, and excessive dryness will check healthy development.

In tropical countries, shading by mats is provided on canopies eight feet high, so as to admit morning and evening light, but to exclude the scorching rays of the noonday sun. Evaporation is also checked by these devices. During the wet season these mats prevent excessive flooding of the beds or damage to crops.

Nutrients may be applied either as fertilizer grade chemicals or in the form of synthetic resins. The grower is given a quantity of prepared fertilizers in a tin, and told to apply so many measures of the mixture to the surface of the growing medium at stated intervals. In practice, this means an application rate of up to two ounces of the fertilizer salts every ten days to each square yard of trough surface. There are suitable nutrient mixtures for dry and wet seasons. Immediately after the application the dry salts are washed down into the root zone by a light spray of water. No chemical is allowed to fall on the plant's foliage during spreading.

Peasant farmers in India soon catch on to this simple technique. Indeed, the fertilizers are frequently made up into tablet form before issue. An ordinary aspirin-making machine is quite suitable for doing this. Nor would such a method come as a complete surprise to African farmers, for the Department of Agriculture at Zaria in Nigeria has for some time been running fertilizer courses for local peasants at the Mamaru farm, where illiterate cultivators are taught quite easily how to use pellets for manuring crops—the Hausa proverb, 'Gani ya kori ji' (seeing is believing) applies strongly here.

With amberlites or synthetic resins, one application just before the beds are planted will last a crop for six months. It is necessary to add potassium nitrate to the water twice weekly at the rate of twenty ounces per one hundred gallons.

The question of water consumption is important. It is not possible to lay down hard and fast figures, since obviously in different areas the rate will vary. In Bengal, in the northern regions, it needs 20 gallons two or three times weekly during the dry season to keep suitably moist a trough of one thousand square feet in area. A device for automatically distilling fresh water from brine in regions of continental climate has been tested successfully. The apparatus is portable and is easily made locally from metal sheets. In nearly all places in the colonies water is available from bore holes, or artesian wells, in limited quantities, and it is far better to conserve the supply by piping it into hydroponic beds than to waste it by irrigating open fields, where much is lost in seepage or evaporation.

The yields of crops under hydroponics

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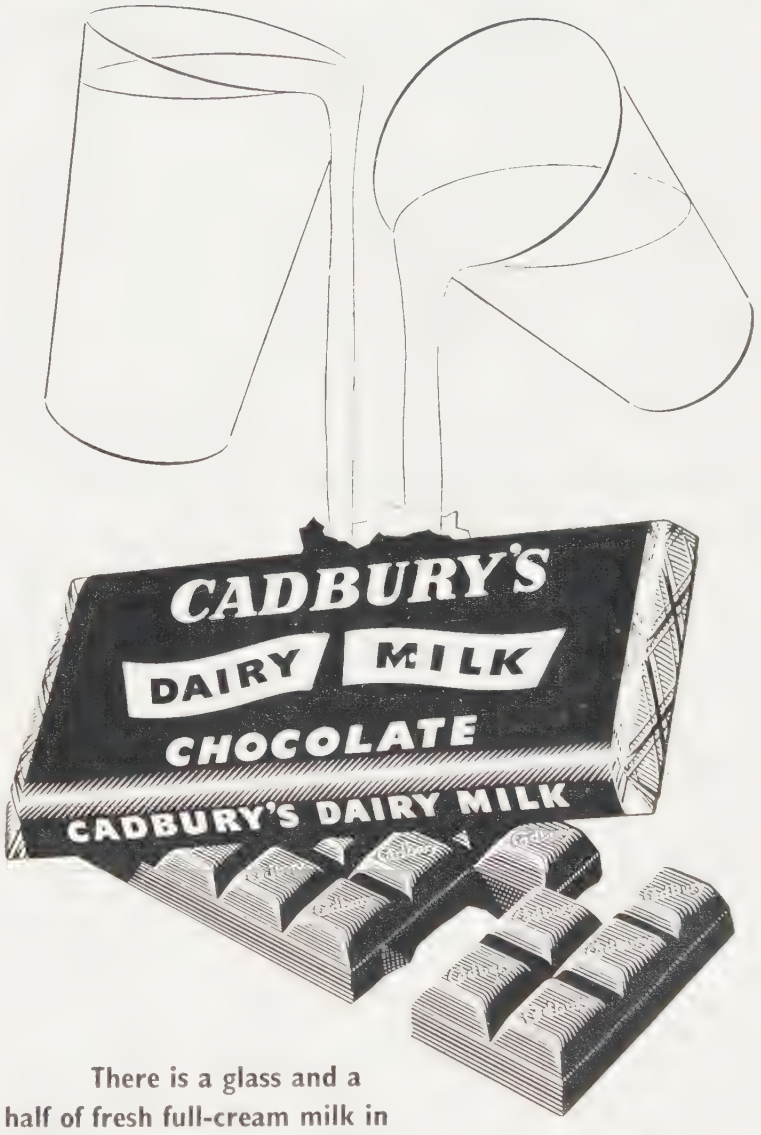

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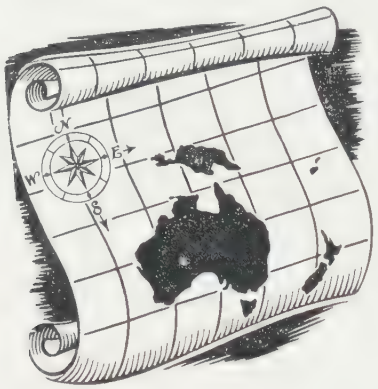

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have been increased to a remarkable extent. Rice at the Indian demonstration centres has given over 8,000 pounds to the acre. The best Japanese paddy cultures, where human excreta is employed, only produce 6,000 pounds, while the average soil yield in India is now about 1,000 pounds per acre. Maize of the Fellow Flat variety gave 6,000 pounds of grain off the cob to the acre, against normal agricultural figures of 2,000-3,000 pounds. All varieties of vegetables do well. Tomatoes respond exceptionally, and over 24 pounds of fruit per plant, or 200 tons to the acre, are regularly obtained in Bengal with this crop. Groundnuts, sorghum, tobacco, and various kinds of fibres have also been grown.

In estate and plantation work, hydroponics conducted according to the simplified Bengal methods has many uses. Better seedlings of tea, coffee, tobacco, sisal, rubber, cocoa, and other crops, may be raised in permanent soil-less beds, year after year, at less expense, and with lower mortality, than by soil cultivation. Costs are reduced in hydroponics. In India the tea growers are using hydroponics to grow seed for planting up new gardens, instead of the old method of rooting cuttings in fresh-dug ground each season. The Coffee Board of Kenya is also showing keen interest in the possibilities of hydroponics. During trials in the Gold Coast in 1951 the rate of mortality of tobacco seedlings removed from the seed beds was greatly lowered when soil-less techniques were used, with consequent better growth to maturing.

It has been found in India that the monthly cost of maintaining a hydroponicum of one acre in full bearing is only the equivalent of £3, excluding extra labour for harvesting. It takes a man just about 40 hours a month to look after a 'farm'. Installation costs are lower than the clearing, ploughing and cultivation with virgin ground; and, moreover, hydroponic units reach maximum efficiency immediately and give good results in three months.

In many areas of the British Commonwealth hydroponics conducted according to the simplified Bengal methods would be of great value—in Gibraltar, where the mighty Rock could be made to bear luxuriant crops; in overcrowded Malta; or the semi-desert lands of Aden; or the congested West Indies, now suffering from a dearth of occupations. In West Africa, the eroding and over-populated north-east corner of the Northern Territories of the Gold Coast could be made to produce abundant crops at low expense. Other appropriate territories suggested are Tanganyika, with its poor soil, Bechuanaland, and similar areas. In British Guiana, at Ascension Island, and in the Bahamas, hydroponics are firmly established. They are not meant to displace soil cultivation, but

to supplement it, and there is much to recommend their use on a wider scale throughout the Commonwealth.

A Hydroponic Information Centre has been set up at P.O. Box 31, Bombay, India, to answer questions. Requests for advice may also be sent to the author, care of CORONA.

EDITOR'S NOTE: The following is a list of references to additional reading on this subject:

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Cultures sans sol, par Pierre Chouard . . . Paris, La Maison Rustique, 1954.
200 p. illus.
Bibliographie sommaire p. 187-190.

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Possibilities of soilless cultivation in coffee growing—new and simplified methods of hydroponics. (The Coffee Board of Kenya Monthly Bulletin, vol. XX, no. 230,—1955, p. 38-41, Nairobi, the Board, 1935 —)

Homès, Marcel V.

L'aquiculture, par Marcel V. Homès . . . Jacques R. Ansiaux . . . et Germaine van Schoor . . . 2ème èd. Bruxelles, Ministère des Colonies. *Direction de l'Agriculture*, 1953.
151 p. illus.

Tincker, M. A. H.

The soilless cultivation of plants (*World Crops*, vol. 4, No. 6, June 1952. London, Leonard Hill Ltd., 1949 —)

Preservation of Prawns in India

The utilization of prawns in South India presents problems similar to those met in some of the Pacific Islands. The prawn fishery has a very short peak period during the monsoon, causing a glut of a perishable product. To extend the marketing period of the catch, the Fisheries Department of Madras produces on a large scale, "semi-dried" prawns which are considered more attractive than the traditional "beach-dried" product.

The prawns are held in boiling 6% brine for two or three minutes, then placed for fifteen minutes in cold saturated brine, and finally dried in an oven at 50°C. (122°F.). The product is rubbery in texture and contains 45% of water.

The bacterial content of the raw material is usually high, but the heat and concentrated salt solutions used in processing ensure that few bacteria remain in the final product. It was found that the "semi-dried" prawns remained in good condition for eight weeks when kept in paper-covered glass jars, but were attacked later by moulds. Prawns dried to a hard product containing 22% of water were still in good condition after twenty weeks under the same conditions of storage.

This method of preserving prawns or shrimps might well be useful in places where they are caught in large amounts during the short season. The only requirements are salt and simple cooking and drying equipment.—H. S. MCKEE.

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QUARTERLY READING LIST No. 19

A Bibliography of Publications relating to Social Development in the South Pacific.

THIS reading List represents an attempt to note every item to appear in the field of Social Development in the South Pacific during the quarter; the entries are drawn from over 100 periodicals which are regularly examined, as well as from bibliographies, publishers' notices and similar material. Publications of the South Pacific Commission have not been indexed. Items marked with an asterisk have not been seen in the Social Development section. The Executive Officer for Social Development, G.P.O. Box 5254, Sydney, will be glad to obtain for any metropolitan or territorial Government copies of items listed.

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Agriculture

(1) JOLLY, A. L.: A third revolution in tropical agriculture. *New Commonwealth*, Jan. 23, 1956, pp. 61-2.

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(3) HOEBEL, E. Adamson: The law of primitive man; a study in comparative legal dynamics. Camb., Mass., Harvard V.P., 1954, 357 pp. a review *Man*, June, 1955, pp. 93-5.

(4) McCARTHY, Frederick D.: The races of man in Oceania. *The Australian Museum Magazine*, March 15, 1956, pp. 16-20.

(5) PARSONS, Robert T.: The missionary and the cultures of man. *International Review of Missions*, vol. 45, no. 178, April, 1956, pp. 161-8.

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Cargo cults and other nativistic movements

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(15) HOLMES, Charles H.: Travel in the Pacific region. *Walkabout,* May 1st, 1956, p. 29.

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(16) BRADLEY, Kenneth: The pattern of freedom: a study of the approach to self-government in dependent territories. *New Commonwealth,* vol. 30, nos. 11-13; 1955; vol. 31, no. 1, 1956.

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(17) SELWYN-CLARKE, Sir Selwyn: An A.B.C. for housing. *New Commonwealth,* Dec 12th, 1955, pp. 577-81; Dec. 26th, 1955, pp. 632-637.

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(19) HALL, Roberts A. J.: Innovations in Melanesian pidgin (Neo-Melanesian). *Oceania,* vol. 26, no. 2, Dec., 1955, pp. 91-109.

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GILBERT AND ELLICE ISLANDS

General

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Nine Years Of Service

(Continued from page 32)

to the Commission itself. The results of this sharing of available knowledge are apparent in the record of the Commission's achievements.

It may be that the phase of defining the problems in various fields and stimulating original research into them will give place in the future to the provision of a greater measure of technical assistance to territorial administrations than has been possible in the past.

The community of interest existing among the Commission's participating governments in the welfare of the Pacific islanders, and their primary concern with the problems of health, economic and social welfare as distinguished from political development, have ensured that sessions of the Commission have never been used as sounding boards for national policies. Commissioners are deeply conscious of the responsibility with which they are charged, and are aware of the desire of the islanders themselves that the Commission and its auxiliary bodies should serve as a means for accomplishing those changes which they can see must be made in their economic and social environments to ensure their further progress.

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PACIFIC READING

Material in this section is contributed by the South Pacific Commission Literature Bureau. Any enquiries relating thereto should be directed to Box 5254, G.P.O., Sydney, Australia.

Notes and News

Literature Bureau Publications. In the last few months three books sponsored by this Bureau have been produced through publishing houses; they are: *Food and the Work it Does,* by Lucy Hamilton, published by Macmillan & Co.; *Plays for Young Pupils,* by Camilla Wedgwood, published by Longmans, Green; and *Rice,* by W. Cottrell-Dormer, also published by Longmans, Green. The Bureau has also produced, on behalf of the British Solomon Islands Protectorate Government, a booklet entitled *Solomon Islands Stories.* Details of these books appear in the Book List of this issue.

Several more books are expected within the next few months; they include a collection of stories from Fiji describing deeds of bravery in both war and peace, entitled *Heroes from Fiji.* The author of this book, Mr. R. S. Adam, is Director of the Educational Research Institute in Fiji. *Papua and New Guinea in Pictures,* appearing shortly, is a social studies book designed mainly for use in schools from fifth-year level of English. It has been profusely illustrated with excellent photographs, alternate pages being devoted to pictures, with accompanying text opposite. The author of this book, Mr. E. P. W. Marriott, has had extensive experience of educational work in the territory.

Bookselling in Samoa. Apart from several in Fiji and New Caledonia, there are few bookshops in the Pacific catering for the needs of the islands peoples. Although there is a need for much new literature produced especially for the Pacific, there is already a great deal which is useful and would be appreciated were it freely available to the peoples through bookshops. We are very pleased, therefore, to be able to publish the announcement, which appears below, from the Methodist Mission in Samoa:

> On 4th April the first bookshop in Samoa was officially opened. It is the "Wesley Bookshop", a venture of the Methodist Mission in Samoa.
>
> In September 1955 work was begun on the construction of a modern concrete shop ideally situated on the main street in the centre of Apia, the capital of Western Samoa. Unfortunately a succession of delays in obtaining materials for this work was met. Meanwhile supplies of books were arriving from publishers and these stocks were accumulating. A decision was made to thoroughly renovate a weatherboard building at the rear of the property and to begin business in these temporary premises. It is intended later to make this building the main bulk stock room. However, these temporary premises have taken on a new, bright and attractive atmosphere with the well-stocked shelves of gaily-coloured books.
>
> The shop is staffed at present by one European, Rev. N. Mapperson, who is the Book Steward, one young Samoan man who was educated in Sydney, and one Samoan girl assistant.
>
> A prominent sign was erected on the main street directing people to the premises. This in itself is a sign of the times for Samoa, being a mark of the rapidly-increasing thirst for literature among the younger generation of these islands. English is fast becoming a prized possession of the young people and is leading them to seek knowledge never available for their parents.
>
> The stock covers a wide range of reading, including children's books, latest travel and adventure, fiction in both paperbacks (which are popular) and well-bound editions, school story-readers, educational texts, a cautiously-selected section of technical books, stationery for school and general purposes, a religious section and Sunday School supplies, periodicals including English comics, and a very small vernacular section.
>
> Special attention was given to procuring books in simple English with a graded vocabulary. More of this type of literature has been obtained than might be imagined possible. Other special features of the stock are well-illustrated books, as pictures speak all languages, and a section of Pacific islands interest.
>
> The European population have been delighted at the possibility of satisfying their craving for reading. "It's a touch of home", has been the comment of some. The Samoan people have been delighted to see so many attractive books together. Every afternoon school children fill the shop and browse through book after book.
>
> Behind the launching of the business there could be told a story of months of organization and initiative, guided by the sound and freely-given advice of the Literature Bureau of the South Pacific Commission, together with encouragement by the Western Samoan Government, who have been very conscious of an obligation to supply literature to the people. It has been a story, too, of learning the whole business from the very beginning, getting first contacts with publishers, trying to make wise selections from catalogues, and speculating as to what might be the response in an untried field with no past experience to guide one, trying to stretch out the limited capital which the Mission could make available for the venture, and even learning a system of accountancy and book-keeping.
>
> Now that it has begun, it is evident that the response will justify the venture and that many of the fears and anxieties have been unwarranted.
>
> This year promises to be an all-important one in Samoa in the realm of literature, as the Government of Western Samoa has its plans moving for the establishing of a Public Library.
>
> The Wesley Bookshop expects to shift into its modern building in about two months' time. Meanwhile it is pioneering the way for a wide distribution of literature in these islands.

Klischograph—An Electronic Blockmaker. The main factors preventing the more frequent use of illustrative material in much of the islands' press are (a) the relatively high cost of block-making, (b) the difficulty in having the blocks made when required, since in most cases it is necessary to send the copy to either Australia or New Zealand for processing, and (c) the long delay in receiving the finished blocks, for usually the weight of the metal makes the use of air freight too costly, necessitating despatch by slower sea mail.

A possible answer to these problems now seems likely with the development of an electronic engraving machine known as the Klischograph. With this machine an operator, who need not be experienced in process engraving, can produce a first-class half-tone block in either of two screens in a matter of minutes on a plastic foil weighing only a few ounces. At present, blocks can be only made the same size as the original copy—there is no provision for any enlargement or reduction—and they are limited to a maximum size of 6" x 8". A full-size engraving can be completed in 18 minutes, while smaller pictures such as 6" x 4" or 3" x 4" take 10 and 5½ minutes, respectively.

A particularly valuable feature of the machine is that the completed block can be undercut by placing it face down on the machine; this then does away with the necessity of any make-ready for printing.

The engraving is produced on a special plastic material measuring 0.06" in thickness, and the surface is similar to that of an ordinary half-tone photo-chemical process engraving. The printed results are also comparable; the makers claim that these plates can be used for direct printing on

(Continued on page 54)

BOOK LIST No. 14

Items reviewed have been chosen for their general interest or for their relevance to educational and development problems in the South Pacific area. Wherever possible the price stated is the published price in the country of origin.

GENERAL READING

PLAYS FOR YOUNG PUPILS. C. Wedgwood. Melbourne: Longmans, Green; A.2s.6d. 1956. pp.X-54. (*South Pacific Commission Literature Bureau publication*)

The five plays in this book have been written especially for overseas pupils who are learning English as a second language. As the author says in her interesting introduction written for teachers, there is no doubt that the best way to learn to speak a language is to speak it. As there are many differences between conversational and written English, practice in conversation cannot be achieved by merely reading from books— pitch, stress, and intonation when reading aloud are substantially different from ordinary conversation; moreover, written English does not take account of the elisions such as "can't", "I'll", "don't", etc., in fact, only too frequently can the just accusation be made against those who have learnt to speak English as a second language that "they speak like a book".

These plays should give substantial help in teaching students to speak English accurately; and the author has certainly achieved her object in making them not only of assistance in this direction, but also entertaining and enjoyable.

The plays should prove useful to children who have reached standards 2-4 of the English course. Four are sufficiently short to enable them to be performed by two or three different groups of children in a single English period. The fifth play is somewhat longer, and each scene could be taken separately in separate lessons. In classes consisting of girls only or boys only, the plays could be modified so that characters were only male or only female. Modification of the text along these lines could prove a useful exercise in English for the class before the play was performed. All the plays take account of the probable limitations of equipment in schools, and can be best performed in the open air.

SOLOMON ISLANDS STORIES. Processed by South Pacific Commission Literature Bureau for the Office of Information, British Solomon Islands. 1955. A.2s. pp.32. Illust.

This book contains four folk stories with a Solomon Islands background and was produced by this Bureau at the request of the Administration concerned. The manuscript was prepared by the Public Relations Officer, Honiara, as an attempt to provide islanders in the area with some suitable reading material. Each story is written in simple English, illustrated with 2-colour line drawings, and is suitable for either adult reading or for school children at about 4th to 6th year of English level.

This book is a good example of low-cost production when only a very small edition is required. The text was prepared using an ordinary typewriter and the material then printed by an offset duplicating process. Single inspection copies with details of costs are available on request from the Literature Bureau to all interested.

WHY THE KIWI CANNOT FLY. G. N. Lansdown. London: Macmillans; A.2s.9d. 1955. pp.31. Illust. (*Animal and Bird Series*)

This book is the most recent addition to the series, all of which have been written by the same author. It contains 15 short and amusing fables, most of them about birds found in New Zealand. It has been simply written and the clear line illustrations are very good. Other titles in the series are: *Why the Lion Roars* (reviewed in Pacific Reading No. 9), *Why the Giraffe is Dumb*, and *Why the Zebra has Stripes*. This series has proved tremendously popular in Africa and some of the titles have been translated into many of the African vernaculars. The author has now prepared a collection of animal stories from the Pacific, which the South Pacific Literature Bureau hopes to publish, in association with Messrs. Macmillans, in the near future; it will be entitled, *How Crocodiles Learned to Bite*.

A PATTERN OF ISLANDS. (Junior Edition). Arthur Grimble. London: John Murray; stg.6s. 1955. pp.154. Illust.

Apart from some abridgment this edition is the same as the original. There is little doubt that it will be difficult for any islanders but those with a really good knowledge of English to understand this book, which employs an extensive vocabulary and is written in a style which is anything but simple. But there is equally little doubt that those who are able to understand it will appreciate it. It is interesting to note how popular material from the Pacific can be, and although sales of this book have not equalled those of the *Kon Tiki Expedition*, they had, at the time of publication of this edition, reached the very considerable figure of over a quarter million copies in English; in addition it has been published in America and in the languages of eight other countries.

Sir Arthur Grimble is not only a born storyteller, but also has two other great assets: his knowledge of, and sym-

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Let's Play a Game. LEON BOUCHER, recently English Master, Munali Secondary School, Lusaka, Northern Rhodesia. This little book contains twenty-two games which, together with their variations, provide at least forty-two ways of helping pupils in Colonial Territories to improve their knowledge of spoken and written English. Some of the games can be used even during the first term of learning English, and all except one can be used in the higher classes. 1*s*.6*d*.

King Solomon's Mines. Retold by HAYDN PERRY. H. RIDER HAGGARD'S tale is the latest title in *The Sword-in-Hand Library*, a series of famous stories retold in simplified English for those learning the language. Illustrated. 1*s*.9*d*.

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pathy with, the peoples of the islands; and his ability to judge their way of life and customs on their own merits, and not, as many authors do, to compare them unfavourably with European customs and habits. Moreover, his ability to laugh at his own shortcomings provides many amusing incidents in these stories. The multifarious duties of a District Officer in the British Colonial Service of the Pacific make interesting reading, as do the amusing and detailed descriptions of certain aspects of the way of life of the islanders.

SCIENCE

RADAR WORKS LIKE THIS. Egon Larsen. London: Phoenix House; stg.8s.6d. 1952. pp.64. Illust.

As the author points out—"although radar is a relatively new invention, its principle is old. Nature developed it millions of years ago to help bats fly at night without bumping into things". Simply written and amply illustrated with 65 clear diagrams and drawings, this book is an elementary introduction to the principles of radar. This is not a technical book in the true sense of the word, and the author's main aim is to stimulate interest by describing many of the more important uses to which radar has been put in peace and war. Following a short discussion of what radar is and its uses during World War II, other chapters describe in some detail its application as a navigational and other aid at sea, in the air, in meteorology and astronomy, as well as showing how it is used in jungle navigation, channel swimming, and whaling. Secondary school students with enquiring minds, and perhaps adults, will find this book fascinating; it could also be a very useful addition to many libraries in the islands.

HEALTH

FOOD AND THE WORK IT DOES. L. Hamilton. London: Macmillans; A.3s. 1955. pp.46. Illust. (*South Pacific Commission Literature Bureau publication*)

The author of this book is the dietitian in the Department of Public Health in the Territory of Papua and New Guinea. The book has been written specifically for Melanesia, although, as many of the foodstuffs found there are common in other parts of the Pacific, it will probably have a much wider use. As the title suggests, the book describes the work which food does; it explains simply the sources and work of starch, sugar, fat, proteins, minerals, and vitamins; and the text is profusely illustrated with black-and-white drawings. A simple chart at the end of the book shows the food values of average servings of food. This book should prove extremely useful at upper primary school level, in teacher-training colleges, and secondary schools.

YOUR BODY AND THE WAY IT WORKS. Winifred Cullis. London: George Allen & Unwin Ltd.; stg.3s. 2nd Edition. 1950. pp.32. Illust. (*"Understanding the Modern World" Series*)

This book may prove useful as an elementary introduction to physiology. In simple language the author describes the structure and functioning of the various systems and organs in the human body. Contents include: the brain and nerves, the muscles, the skeleton, respiration, circulation, the blood, digestion, temperature regulation, the kidneys, the special senses (smelling, tasting, seeing, hearing and feeling), reproduction and heredity.

Each chapter is well illustrated, with excellent clear diagrams—many in two colours—and the whole book is attractively produced. Self-testing questions on each chapter under the heading of "Things To Do" add to the usefulness of this book. Secondary schools.

ARTS AND CRAFTS

BLACKBOARD WORK. H. G. Ramshaw. London: Oxford University Press; stg.3s. 9d. 1955. pp.60. Illust.

This book is intended to show both practising and trainee-teachers how they can improve their skill in using the black-

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board as a more effective teaching aid. As the author points out: "Blackboard and chalk form the most potent piece of apparatus available to the teacher in the practice of his craft . . . the ability to produce simple drawings of common objects, animals and people will interest young children much more than a group of circles or 'blobs' and in many cases will make the meaning of the problem clearer to the pupil". With this theme, the author shows by practical example how a teacher can readily improve his blackboard work and with practice produce very creditable illustrations.

Each of the sixteen chapters deals with a particular aspect. The first three are basic and deal with the drawing of straight lines, squares, triangles, circles, curves and ellipses, on which the later work is based. Then follow detailed instructions on how to draw trees, buildings, animals, matchstick men, action scenes and written work. The final chapters describe the use of the blackboard for language teaching, arithmetic, geography and nature study.

The material is simply and clearly written, well illustrated with many drawings, and is based on a two-year course used very successfully in Africa by the author. The latter well realizes that it is not possible to turn every teacher into an artist, although he does firmly believe that—"any person of normal intelligence who is genuinely anxious to learn can be taught to draw with reasonably competence—certainly to a degree of competence which makes it worth while for him to use his drawings as an aid to his instructional and teaching work".

To sum up, this is an excellent book which could be used with profit by most teachers in the Pacific and elsewhere.

AGRICULTURE

THE FARM TRACTOR. Ministry of Agriculture and Fisheries. London: H.M. Stationery Office. Stg.1s.6d. 4th Edition, 1954. pp.44. Illust.

We receive many enquiries from people in the islands for simple books on mechanical subjects. This one, dealing with the operation and maintenance of the tractor, is one of the best we have yet seen.

The book contains four sections—*Section 1* covers very thoroughly the basic theory and operation of petrol and diesel engines. *Section 2* describes in detail various tractor components, including the fuel, ignition, lubrication, transmission, cooling, hydraulic and electric systems. *Section 3* discusses tractor operations such as starting up, engine and transmission controls, coupling implements, and general tractor handling. *Section 4* deals with the general principles of tractor maintenance, and lists daily and weekly routine check lists and the detection of simple maintenance faults.

Attractively produced, and well illustrated with three-colour illustrations, this book should prove extremely useful to all who are connected with tractor operation. It has, however, been written primarily for those whose mother tongue is English, and although the text has been kept fairly simple, it will not be easy to understand for those who have not a really good knowledge of the language.

RICE. W. Cottrell-Dormer. London: Longmans, Green; stg.2s.6d. 1956. pp.16. Illust. (*South Pacific Commission Literature Bureau publication*)

In all newly-developing areas the reading material often most urgently required is that of a practical nature on basic subjects such as hygiene and agriculture. Reading material of this nature can not only fulfil its main object of providing essential information but can also, as this book does, assist newly literates to improve their reading ability.

Mr. Cottrell-Dormer has had many years of experience in Papua and New Guinea as an Agricultural Officer, and he has written this book especially for the peoples of Melanesia. He explains, in a simple and lucid manner, the advantages of rice as a food; he mentions the two main methods of

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rice growing: wet paddy and dry paddy; but as conditions in most parts of Melanesia favour dry paddy he describes this in detail. Having covered the preparation of the land, the planting, and care of the crop and its harvesting, he goes on to describe the storing, threshing, and milling of the paddy. The book is large, 11¾" x 8½", and the text is illustrated by 37 excellent black-and-white drawings. The arrangement of the text into panels, each of which is numbered, lends itself ideally to the production of vernacular translation, which could be mimeographed separately and paragraphed and numbered to correspond with the numbers in the text of the book.

South Pacific Literature Bureau

The following books, which have been published by various publishers in association with the Literature Bureau, are available from booksellers.

RICE. W. Cottrell Dormer, published by Longmans, Green & Co. stg.2s. 6d.

PLAYS FOR YOUNG PEOPLE. Camilla Wedgwood, published by Longmans, Green & Co. A.2s. 6d

WEALTH FROM THE COCONUT. W. V. D. Pieris, published by Ure Smith Pty. Ltd. stg.2s. 6d. (available in the following language editions: English, French, Fijian, Pidgin, Maori (Rarotongan), Samoan, Tongan, Malayan).

FOOD AND THE WORK IT DOES. Lucy Hamilton, published by Macmillan & Co. A.3s.

THE HIRI. Camilla Wedgwood, published by Longmans, Green & Co. A.1s. 6d.

ACROSS NEW GUINEA. Ivan Champion, published by Longmans, Green & Co. A.1s. 6d.

THE MAGIC POT. Peter Livingston, published by J. B. Wolters & Co. stg.1s. 3d.

NA DINAU SA DAU VAKAVUNA (a Fijian edition of "Debts Make Difficulties"). Eunice Carpenter, published by Sheldon Press. stg.8d.

NA I VOSAVOSA VAKAVITI E SO (Fijian idioms). Anare K. Raiwalui, published by Oxford University Press. A.4s.

A MOTHERCRAFT BOOK. N. Stead, published by Longmans, Green & Co. A.5s.

HEALTH LEAFLETS AND BOOKLETS

The following health leaflets and booklets are available from the South Pacific Literature Bureau, Box 5254, G.P.O., Sydney.

Tina Protects her Family	A.16s. 8d. a hundred
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"Pacific Reading"—Notes and News

(Continued from page 50)

either flatbed or rotary machines and are satisfactory for about 200,000 impressions.

Although the initial cost of the machine is fairly high, approximately £A.3,000, it still seems likely that this type of equipment will appeal to those printers who cannot afford the much higher expense of installing and maintaining the more orthodox process engraving plant, requiring at least two skilled operatives, but who would have sufficient business to warrant making plates for their own and outside use. This Bureau would be pleased to provide fuller details of this equipment to anybody interested.

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VISUAL AIDS

Films in the Commission library are marked with an asterisk before the title, and are available for viewing by any metropolitan or territorial government on application to the Executive Officer for Social Development, Box 5254, G.P.O., Sydney, N.S.W., Australia. Age classifications, where given, are intended as a guide rather than a recommendation.

Educational Films

*TABU. 16 mm. 85 mins. Black and white. Sound. Produced by Robert Flaherty and F. W. Murnau in French Oceania.

Several years ago, after considerable difficulty, the South Pacific Commission succeeded in obtaining a print of *Moana of the South Seas,* made in Western Samoa, by Robert Flaherty. *Moana* is generally accepted as one of the world's great films and as presenting a faithful picture of Samoan life as it was thirty years ago. Now after five years of intermittent negotiation, the Commission has secured a copy of *Tabu,* another famous film made in the South Seas by Robert Flaherty, which is one of the most beautiful films seen by the present writer. Filmed in Bora Bora, in French Oceania, the cast is made up of Polynesians and a few part-Europeans. It is unlike *Moana* in that it has a definite story and at first this is inclined to grate on anyone familiar with the quiet and natural beauty of the Samoan film; but with this difference accepted, *Tabu* will be found just as beautiful in its own way. The story concerns two young Polynesian lovers who through no fault of their own are obliged to leave their native island and seek refuge on a neighbouring island where white men have brought their customs. The end of the story is tragic. Having broken a Tabu they are separated and the young boy dies, but the real tragedy of the film lies in the contrast between the innocent life of the unspoilt island and the one to which the lovers fled; in the pathetic helplessness of the young Polynesian boy faced with a business-like and materialistic way of life among Chinese and part-Europeans. The photography is beautiful and visually the whole film is a work of art. For the most part the acting is natural and some of the scenes of life on the first island are memorable. A serious fault is the musical sound track which is unnecessary and quite unsuitable. Heavy orchestration and bad choice of music interfere with the atmosphere and at times spoil the effect —as in the dancing sequences; but even so the film kept this writer spellbound for an hour and a half.

ADOBE VILLAGE. 16 mm. 20 mins. Black and white. Sound. Louis de Rochemont Associates. (The Earth and Its People Series.) Price: £Stg.32.

From time to time films in this series have been reviewed here and they are usually found to be careful, interesting and well produced. This picture of rural life in Mexico is in line with the other productions though not outstanding in any way. Primitive methods of agriculture and rural industries, life on a Mexican farm, a Mexican family, their customs and occupations, traditional crafts, such as weaving and pottery, making of adobe (clay) blocks for buildings, all contribute to give an idea of life in this picturesque country.

DRY DOCK. 16 mm. 10 mins. Black and white. Sound. Gaumont British Instructional. Price: £Stg.16.

This film was viewed under the impression that it would show scenes of ocean liners and other ships but in actual fact turned out to be a dreary account of building a tremendous dry dock in the mud at Southampton. Apparently all photographed by night and in a fog, the eyes strained to see endless close-ups of concrete mixers turning against a background of Czechoslovakian music and iron girders swinging about on cranes. At the end, a brief glimpse of the Queen Mary was the reward but not enough to justify the boredom of the rest of the film.

ENGLISH CRIMINAL JUSTICE. 16 mm. 20 mins. Black and white. Sound. British Council. Price: £Stg.16/10/-.

The general tone of this film may be rather sophisticated but it gives quite a good picture of the main principles of English Criminal Law. It starts with a brief historical account of early methods of trial—by endurance and by combat—and ends with modern trial by jury. The basic fairness of the law is demonstrated and emphasis placed on the reminder that no man is guilty until he can be proved so; that no prisoner is expected to prove his innocence, but rather is assumed innocent until his guilt can be proved. An example is given of a suspected murderer acquitted by benefit of the doubt, which in British Law is preferable to wrongful punishment of an innocent man.

HOW MAN MADE DAY. 16 mm. 10 mins. Black and white. Sound. Coronet Films. Price: £Stg.16.

Modern lighting as we know it is at one end of a long procession of experiments and discoveries made by man in his efforts to provide himself with light without heat. At first he could not produce one without the other; then he found by the use of pitch, vegetable and whale oils, that he could eliminate the heat and retain the light. Wicks, candles, lanterns and lamps developed, the use of coal gas was discovered and the incandescent electric bulb was invented. The film ends with scenes showing present day neon and fluorescent lighting.

KANGAROOS. 16 mm. 10 mins. Black and white. Sound. Australian Instructional Films. Price: £Stg.16.

This is a pleasant little film, not particularly remarkable except for some agreeable photography. It shows different kinds of Australian kangaroos and wallabies living in natural surroundings, how the young grow and develop in the mother's pouch, how they move about and how they use their tails and legs. Some slow motion sequences give a very picturesque impression of kangaroos on the move.

KATHAK. 16 mm. 10 mins. Black and white. Sound. Dept. of Information and Broadcasting. Information Films of India. Price: £Stg.6.

One of a series on Indian dancing, this film shows classical dances of North India. Starting with a demonstration of hand gestures and facial expressions and their meanings, it then moves on to show two traditional dances. Both performed by a male dancer, they tell stories of Lord Krishna and Lord Siva and are graceful and beautiful. The short film is very attractive and should interest any peoples who retain an interest in their own dances or those of other lands.

THE LIFE STORY OF A FERN. 16 mm. Approx. 20 mins. Black and white. Sound. Gaumont British Instructional. Price £Stg.24.

This is a fairly technical film, more so than was expected, which gives a good deal of information about the growth and development of ferns. It is probably too detailed and specialised for most general purposes but, as so many of these botany films do, contains a number of marvellous and beautiful sequences obtained by speeded-up micro-photography. These show lovely pictures of unfolding ferns, and of young growths thrusting their way through the ground and of the drooping and dying of young ferns in winter. For anyone who, like the present writer, thought of ferns as simple plants, this film is a surprise, showing as it does the complex and lengthy procedure that goes to the making and growth of a fern.

PUBLIC ENEMY NO. 1. 16 mm. 5 mins. Black and white. Sound. Queensland Health Education Council. Price: £Stg.6/8/-.

This film about flies is a disappointment and could have been much better. The subject is a vital one but at least a quarter of the footage is devoted to the close-up of a man's face talking at the audience and to add insult to injury, talking out of synchronisation with the sound track. The only positive impression retained from the film is the information that flies vomit over things before eating them. This fact alone should stir people to eliminate them.

SEA URCHIN. 16 mm. 10 mins. Black and white. Gaumont British Instructional. Price: £Stg.20.

With micro-photography and speeded-up sequences, this film shows the structure of the sea urchin, how it reproduces, the fertilisation of eggs laid by the female, growth of fertilised eggs and development by separation of cells. Some of the sequences are fascinating and the commentary is clear and careful, but on the whole the film is rather advanced technically for general use.

Filmstrips

AUDU WAS A LEPER. Produced by the Adult Education Office, Northern region, Nigeria. Black and white. 39 frames. Typed commentary. Published price: apply.

Subject: Leprosy.
Medium: Photographs.
Technical Standard: Good.
Comment: The story of a young boy who discovers he has leprosy and how he becomes cured. The strip emphasises that not only is a cure possible but, as is evident from the boy's growing confidence, that it is neither painful nor frightening. The strip is rather long and is inclined to be discursive but the photographs are good and with proper presentation should achieve a satisfactory effect. . . . . General.

ELEPHANTS. Produced by Common Ground Ltd., London. Black and white. 27 frames. Sub-titles. Teaching Notes. Published price: Stg.16s. 6d.

Subject: Elephants.
Medium: Photographs.
Technical Standard: Good.
Comment: The filmstrip is divided into five sequences: the African elephant; Indian elephant; catching and training wild elephants; uses of elephants. The last sequence is called "Dumbo" and shows a famous baby elephant being caught and shipped away from her home in Assam to London Zoo, where she is seen taking children for rides on her back. The introduction to the Teaching Notes refers to the distribution of these creatures, which is also shown on a map in the strip, and to their long association with man as means of transport and beasts of burden. Notes and pictures together show the difference between Indian and African elephants, how the animals are trained and used in different parts of the world. The last picture of this sequence, of Indian elephants in gorgeous ceremonial attire, rather shows up the drabness of poor Dumbo's life in London Zoo, surrounded by people with bags of buns. . . . 10 + ages.

FARMERS OF EUROPE. Peoples of other lands series. Produced by Common Ground Ltd., London. Black and white. 35 frames. Sub-titles. Teaching notes. Published price: Stg.16s. 6d.

Subject: Agriculture in Europe.
Medium: Photographs.
Technical Standard: Very good indeed.
Comment: This is a very attractive filmstrip, illustrated with excellent photographs and accompanied by comprehensive notes. The three kinds of farmers shown are dairy farmers of Switzerland, bulb farmers of Holland and wine growers of France. Each of these activities is picturesque in itself and set in beautiful or interesting scenery so that the filmstrip from start to finish is visually pleasant. Intended primarily for junior classes, the author has included additional information in the teaching notes which can be used by more advanced pupils. . . . . 10 + ages.

HERRING FISHING. Produced by Common Ground Ltd., London. Black and white. 33 frames. No captions or sub-titles. Teaching Notes. Published price: Stg.16s. 6d.

Subject: North Sea herring industry.
Medium: Photographs, maps, diagrams.
Technical Standard: Average good.
Comment: Though the conditions under which these fishermen work are so vastly different to those in the Pacific, it may interest islanders to see how fishing is carried on in other parts of the world. The photographs and the detailed notes give a good picture of the herring industry in Britain, the distribution of the main fishing ports, the types of ships and nets used, and how the fish are caught, sold, canned or kippered. Apart from general interest, this strip, when shown in the Pacific, should emphasise the tremendous difference between working conditions in the North Sea and the islands. . . . . 12 + ages.

ITCH. Jet Series. Produced by the Christian Medical Association, India. Black and white. 15 frames. No captions. Printed commentary. Published price: A.16s. 9d.

Subject: Prevention of skin infection and irritation.
Medium: Stick figure drawings.
Technical Standard: Average.
Comment: The commentary to this filmstrip starts on a pleasing note: "Scratch, scratch, scratch!" and the first pictures show a number of little stick figures lugubriously scratching as hard as they can go. The whole family have the complaint and it will get out of hand if something is not done with soap and water, lotions, and antiseptic powders. The mite that causes all the trouble looms large over the screen and over the lives of this unhappy family; but apparently all the measures they take are successful for the final scene shows a beaming face disappearing into a bed now happily free from vermin and itch. Cards duplicating the frames are provided. . . . . General.

MALARIA. Jet Series. Produced by the Christian Medical Association, India. Black and white. 15 frames. No captions. Printed commentary. Published price: A.16s. 9d.

Subject: Measures against malaria.
Medium: Stick figure drawings.
Technical Standard: Average.
Comment: Just because mosquitoes have bitten people for centuries and given them malaria, there is no reason why we should be resigned to this grisly fate. Unlike the apathetic character in the first few frames of this filmstrip, Kalu has no intention of getting bitten. He goes for help as fast as he can and comes back with flit guns, mosquito nets, Gammaxene and Paludrine. By using all these things in the right way he wins his battle against malaria. Flash cards of the drawings in the frames accompany the strip . . General.

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- *EXPERT REPORTS:* The Oxford University Press is publishing a series of Expert Reports in book form for the Commission. Four have been issued to date:

  VOCATIONAL TRAINING IN THE SOUTH PACIFIC. By R. A. Derrick, M.B.E., A.M.I.S.E., F.R.G.S. Mr. Derrick's report consists of a survey of the facilities for professional and technical training in the whole of the South Pacific, and of recommendations for future development.
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  MOTURIKI: A PILOT PROJECT IN COMMUNITY DEVELOPMENT. By Howard Hayden. A fully documented, copiously illustrated report on a pilot project in community development carried out under Commission sponsorship on the island of Moturiki by the Government of Fiji.
  Price in Australia ..... *42/-A.*

  SOCIAL ANTHROPOLOGY IN MELANESIA: A Review of Research by Dr. A. P. Elkin, Professor of Anthropology in the University of Sydney. In this report Dr. Elkin reviews past, present and future anthropological research in Melanesia, designed to advance native welfare.
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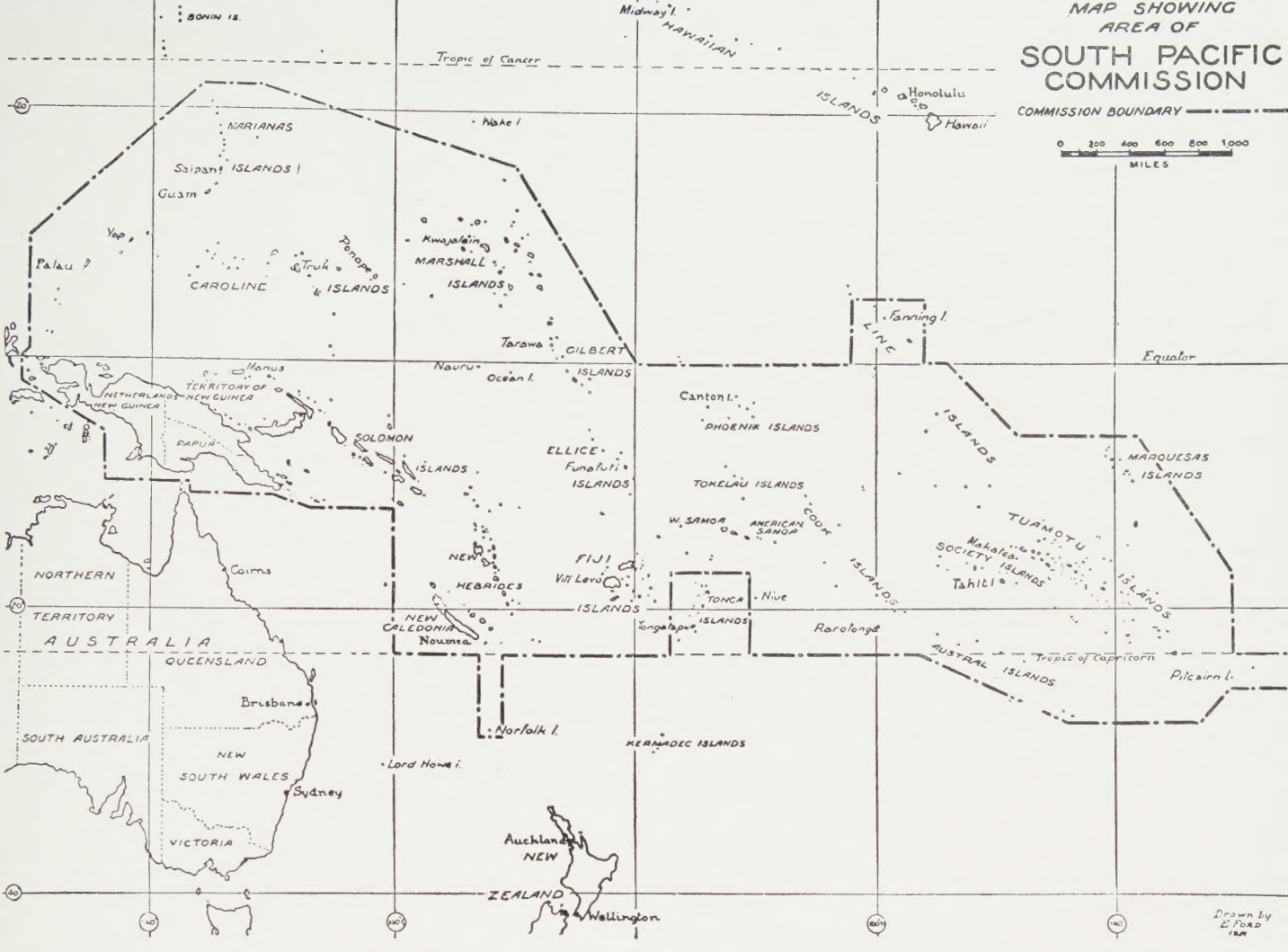

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